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FROM

W. T. Walsh.

March 21, 1902.

Commonwealth of Massachusetts, Supreme Judicial Court.

Hampden, ss.

HOLYOKE WATER POWER COMPANY,
PETITIONER,

v.

CITY OF HOLYOKE.

BEFORE

EVERETT C. BUMPUS, JAMES E. COTTER, AND
EDMUND K. TURNER,

Commissioners appointed by the Supreme Judicial Court.

APPEARANCES:

For Petitioner: FRANK P. GOULDING AND WILLIAM H. BROOKS.

For Respondent: NATHAN MATTHEWS, JR., ADDISON L. GREEN, AND
NATHAN P. AVERY.

VOL. XI.

DEC. 27, 1900 TO MARCH 19, 1901.

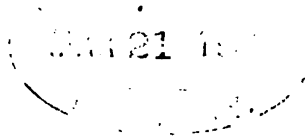
BOSTON:

GEORGE H. ELLIS, PRINTER, 272 CONGRESS STREET.

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H. J. Walsh

STENOGRAPHIC REPORT

BY

FRANK H. BURT, WM. L. HASKEL, E. L. DAVIS, MISS MARY A. POWELL,
AND W. H. JOHNSON.

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AFTERNOON SESSION.

BOSTON, Thursday, Dec. 27, 1900.

CHARLES T. MAIN, *sworn.*

Direct examination by Mr. GREEN.

Q. What is your name? A. Charles T. Main.

Q. Where do you reside? A. Winchester.

Q. What is your business? A. Mechanical and mill engineer.

Q. Will you state your education—that is, tell us any institutions of which you are a graduate? A. I graduated at the Institute of Technology in 1876.

Q. That is, the Massachusetts Institute of Technology? A. Yes.

Q. Will you state your experience since that time, what business you have followed? A. For three years after graduation I remained at the Institute as an instructor in the department of mechanical engineering. I then went to Manchester, N. H., and spent about a year and a half in the Manchester Mills. From there I went to the Pacific Mills in Lawrence and was engineer for the Lower Pacific for about five years, and then superintendent of the same mill for six years. Since that time I have been in general engineering practice.

Q. Whether or not you have made tests of engines and boilers? A. I have.

Q. Whether or not you have installed water plants? A. I have installed quite a number of water plants.

Q. Whether or not you installed an engine plant at Manches-

ter? A. No, I assisted in installing a water power plant there of about 2,000 horse power.

Q. At the Pacific Mills did you put in a water plant? A. I did.

Q. Or assist in it? A. I put in a whole plant there of about 2,000 horse power, also a steam plant of about 2500 horse power.

Q. Did you plan this steam plant yourself? A. I planned both those plants, looked after all the work, and after they were in I had charge of them for several years.

Q. Since you have been in general practice have you designed steam and water power plants? A. Yes, sir, a good many.

Q. What steam power plants have you designed and installed? A. One at the Lynn Gas & Electric Company's electric light station, Marblehead electric light station, Washington Mills in Lawrence; George E. Kunhardt, Lawrence; Massachusetts General Hospital. I have lists of those here from which I can refresh my memory. (Producing list.) Boott Mills, Troy Blanket Mills, Riegel Sack Company, Walter M. Lowney Company; and I am now consulting engineer for the American Woolen Company, which controls 26 mills, and we are doing work in quite a number of those.

Q. Are those steam plants? A. Yes.

Q. What corporations, individuals and mills have you been in consultation with in regard to the question of steam power? A. The Lowell, Lawrence & Haverhill Street Railway Company, the Tremont & Suffolk Mills, Nashville Electric Light & Power, Birmingham Electric Light, Pemberton Mills, S. D. Warren & Co., Baltimore Electric Light, Hollingsworth & Whitney, Salmon Falls Manufacturing Company, Methuen Mills, R. Forbes & Co., and some others.

Q. What water power plants have you installed? A. The one at the Lower Pacific Mills I have testified to. The one at the American Mills Company, the one at the Smith & Dove Manufacturing Company, the Washington Mills, Troy Blanket Mills, Nashua pumping station. We are now installing a large plant at the Montreal Cotton Company.

Q. Water plant? A. Yes.

Q. Whether or not you have reported on proposed developments of water power? A. I have.

Q. And in what instances, some of them? A. On the Platte River, Nebraska; the Housatonic River, Conn.; Kinderhook and Valatie Creeks, New York; Flat River, Michigan; Shawsheen River, Massachusetts; Ashuelot River, N. H.; Ware River, Mass., and some others.

Q. Have you made valuations of properties using steam and water power for various purposes? A. I have.

Q. And will you tell us some instances? A. I have made a valuation for the Smith & Dove Manufacturing Company for the sale of their old mill.

Q. Where is that Smith & Dove? A. At Andover, Mass.; a part of that property was a water power. Also for the sale of water power at the Fulton Mills, one of the American Woolen Company; also for the sale of water power on the Messalonskee River in Maine. I have made a report on the purchase of water powers to the Tremont & Suffolk Mills, and on the Stuyvesant Falls power.

Q. Is the Tremont & Suffolk Mills in Massachusetts? A. At Lowell, Mass. To one or two concerns in Lawrence, and also for the New York Air Brake Company. For rental I made a report to Abbott & Co., Graniteville, Mass.

Q. In condemnation cases have you— A. All of the Metropolitan Water Board cases.

Q. And have you testified in cases in Massachusetts or elsewhere in regard to water powers? A. I have testified in quite a number of cases. Among them are the Weymouth, Cambridge, Whitehall Pond, East Jersey Water Company—that is in New Jersey; Syracuse, N. Y.; Attleboro; Barre, Vt.; Haverhill, Worcester, Winchendon, and Holyoke water supply.

Q. These cases involved the question of water power and the value of water power? A. All of them.

Mr. BROOKS. What was that about Holyoke? Holyoke water supply?

Mr. GREEN. Those are the cases involving the taking of water for the new reservoir.

Mr. BROOKS. Oh, I see; at Southampton.

Q. In what taxation cases have you testified or had to do with—I don't know but you have testified in them all—that in-

volved the value of water power? A. I testified in the Pacific Mills case, Tremont & Suffolk Mills twice (two cases), Massachusetts Mills, Troy Cotton & Woolen Company, and the Lyman Mills.

By the CHAIRMAN.

Q. Where are the Massachusetts Mills? A. At Lowell; the Massachusetts Cotton Mills.

By Mr. GREEN.

Q. Where are the Pacific Mills? A. Lawrence, Mass.

Q. The Warren Company, where is that? A. Warren.

Q. Warren, Mass.? A. I did not testify on that; I simply made a report.

Q. And in the Lyman Mills case, that is where? A. That is at Holyoke.

Q. That is the case of the Lyman Mills against the city of Holyoke? A. Yes.

Q. Did that involve water power? A. It did.

Q. And is that water power on the same level canal as the electric light station? A. It is.

Q. On the first level canal? A. Yes.

Q. Whether or not you are familiar with the water power at Lawrence and Lowell? A. I am very familiar with the water power at Lawrence, and quite familiar with the water power at Lowell on account of having to study it for these cases, and also for some of the mills.

Q. Have they permanent water power there and surplus water power? A. They have.

Q. Which they sell to mills? A. They sell the surplus; the permanent power has been sold. There is a little permanent power at Lawrence which has not been sold yet.

Q. Have you studied the canal system in the city of Holyoke? A. Yes.

Q. How much time have you spent in studying the canal system and the records of the Water Power Company relating to its water development—water supply? A. In all I have spent at Holyoke six full days looking over the station, and the water power and the records.

Q. That is, you spent that in the city of Holyoke? A. Yes.

Q. Whether or not you are familiar with the water—that is, the supply of water—in Holyoke, the permanent and surplus powers? A. From what I have heard in this case and from what I learned in the study of the water power in connection with the Lyman Mills.

Q. You have had experience in the erection of mill buildings? A. I have.

Q. Have you installed or have you built or planned or had built mill buildings, wheel pits, tailraces, things of that sort? A. Yes, sir.

Q. In what instances? A. In a great many. At the Lower Pacific Mills a number of buildings of various kinds for manufacturing purposes and for power purposes. At the Washington Mills a number of buildings of different kinds for manufacturing, storing and for power purposes. At George E. Kunhardt's, mill buildings, dye house and engine and boiler house and a chimney. At the Smith & Dove Manufacturing Company, buildings for manufacturing purposes. At the Ipswich Mills, store houses and extensions to their mills. Troy Blanket Mills, a new mill, boiler house, engine house and chimney. For the Riegel Sack Company, a new mill, boiler house, engine house and chimney. For the American Woolen Company, mills, store-houses, boiler and engine houses and chimneys. For the Walter M. Lowney Company, a new factory, boiler house, engine house and chimney. Marblehead Electric Light station, buildings and power plant. For the Lynn Gas & Electric Company, buildings and power plant; and consultations on many other buildings. I am now planning a large mill for the Montreal Cotton Company.

Q. I think I asked you if you were familiar with the prices charged for the permanent and surplus power in Lawrence and Lowell? A. Yes, sir.

Q. Whether or not in connection with the examination of water power in Holyoke, you made an examination of the water development at the electric light station? A. I did.

Q. The wheel pit and tailrace and the other features? A. I made as much of an examination as I could without going inside of the wheels.

Q. And also of the steam plant? A. I did.

Q. The buildings and the machinery in the steam plant? A. I did.

Q. For the purpose of valuation? A. Yes, sir.

Q. Among the buildings that you built, are there any electric light plants or any buildings of electric light plants? A. Buildings for the Marblehead Electric Light station, and for the electric light station of the Lynn Gas & Electric Company. I have also planned a building which I did not mention for the Columbus (Ga.) power plant.

By Mr. MATTHEWS.

Q. Is that an electric light station? A. Yes, that is a water-power electric power station. I might add to that that for several years I have been consulting engineer for Stone & Webster on all of their construction and power plants, omitting the electrical part.

By Mr. GREEN.

Q. By that you refer to the electrical machinery? A. Yes.

Q. Are you familiar with the terms on which water power is bought and leased in Massachusetts? A. I am familiar with the terms in Lawrence and in Lowell, and I am familiar to a certain extent with the terms in Holyoke on account of having heard so much about it in this case and from my study of it in the Lyman Mills case. I also am somewhat familiar with the terms in Manchester.

Q. Manchester, N. H.? A. Yes.

Q. And in Manchester have they permanent and surplus power? A. They have.

Q. Which is sold to various corporations for mill purposes—sold or leased? A. Sold or leased, yes.

Q. Will you tell us if you have an opinion as to the fair market value of the water plant of the Holyoke Water Power Company used in its electric business? A. The fair market value of the water power plant, including racks, headgates, penstocks, wheelpits, tailrace, wheel house, tunnels and machinery, but not including land and water privilege, \$60,920.40.

Q. Have you an opinion, and if so, state it, as to the fair

market value of the steam plant, including the engine house, boiler house, chimney and machinery? A. \$34,971.50.

Q. Did you prepare a valuation of the dynamo building at our request to be used by another witness? A. I did.

Q. Have you it with you? A. I have it in my notes. Would you like it?

Q. Yes, will you state what, in your opinion, the valuation of that building was as a building? A. I made an estimate of cost.

Q. An estimate of the cost alone? A. Yes.

Q. Then will you state what, in your opinion, that building would cost new—as of what time? A. January 1, 1898.

Q. As of January 1, 1898. A. \$23,700.

Q. What does that represent? Whether that is the contractor's price? A. That would be the contractor's price. It includes all the contractor's profits.

Q. In that is there anything included for engineering? A. It included all the incidental expenses for engineering and interest on the cost during the construction. It is intended to be an outside figure to cover all of the cost.

Q. Can you tell us what your estimate was of the cost, leaving out the engineering and incidentals, but simply including contractor's profits? A. \$20,927.72.*

Q. Whether or not you have valued the land, water power privilege and the water power for the purpose of running the electric light station? A. I have.

Mr. GOULDING. Now, what does that include? The water power—

Mr. GREEN. The land, the water power privilege and the water power.

Q. Whether your valuations are on one or more suppositions or assumptions? A. I have made valuations on various assumptions, but have finally arrived at the fair market value of the land, water power and privilege—yes, for the land, water power and privilege for the purpose of running an electric light station.

Q. Whether or not your valuation in these cases depends upon the amount of water to be drawn and upon the rental to be paid? A. It does.

* A schedule of the cost of the dynamo room was subsequently introduced in evidence and is to be printed in a later volume. (See p. 328.)

Q. Will you state the fair market value of the land, water power privilege and water power for the purpose of running an electric light station?

Mr. BROOKS. We object to it.

The CHAIRMAN. We admit it on the same principle—

Mr. BROOKS. I do not understand your Honors have permitted anybody to testify yet on the question of land.

The CHAIRMAN. Well, we do not admit that he is qualified to testify on land like the other witnesses who have testified on land.

By the CHAIRMAN.

Q. I suppose, Mr. Witness, you have taken the valuation of land from some source, haven't you?

Mr. BROOKS. I did not so understand the witness. If I did, I should not have objected.

A. No, sir; I have put a valuation upon the water power, privilege and the land going with it.

Mr. BROOKS. So far as any valuation of his comprehends his valuation of land, we object and would like to be saved upon the question.

The CHAIRMAN. I think that certainly the witnesses for the petitioner testified to the value of the land; for instance, Mr. Allen, who sits here—

Mr. BROOKS. No, may it please your Honors, he assumed the value.

The CHAIRMAN. Has not this witness assumed the value?

Mr. BROOKS. Mr. Main has not assumed the value; he places a value of his own upon it.

Mr. MATTHEWS. I think Mr. Brooks is somewhat in error as to the witness' process. This witness neither assumes a value of the land as land taken from somebody else, nor does he put a value upon the land as distinguished from the rest of the plant, but he values the whole on the authority of a case that I cited to the Commissioners at the argument that we had on the relevancy of the cost of a new plant. It is competent for a witness, who is otherwise qualified, though not having any special knowledge of land values as such, to testify to what land would be worth for manufacturing purposes, and what this witness is asked to do is

to give a value to the whole plant, including the land, for the purpose of running a particular manufacturing industry. If I could have the minutes of that argument I could refer to the case at once, I think.

Mr. COTTER. Is it the case in the 175 Massachusetts?

Mr. MATTHEWS. No, that is not the one.

The CHAIRMAN. I think that this question was passed upon in a very recent case. I am rather inclined to think that the courts have gone to the extent of allowing an expert to testify what land is worth for mill purposes, although he may not have a knowledge of the value of the land.

Mr. MATTHEWS. My recollection is that it was decided in the Tremont & Suffolk Mills case, 163 Mass., or the Troy Cotton Company's case, 167 Mass. The witness suggests that it was the Troy Cotton Company's case, in which he was a witness, so that he may know. There, as I recollect it, somebody connected with the company was put upon the witness stand and allowed under objection to testify what the value of the land was for manufacturing purposes, although he admitted that he had no qualifications as a real estate expert.

Mr. BROOKS. That, of course, is on a different principle, on the principle that an owner can testify.

Mr. MATTHEWS. No, it was not on that principle at all. It was admitted that he had no knowledge of the value of land as land, but he was permitted to testify to its value for manufacturing purposes on the theory that it was not worth any more for manufacturing purposes than other land equally available for that purpose. The land, for instance, upon which this plant is built might have a higher value for some other purpose, but for a manufacturing purpose we contend it is limited in value to what other land equally suitable could be bought for. I thought I could turn to the case itself, but I cannot. I am quite certain it is one of the two I have just mentioned.

The CHAIRMAN. Mr. Cotter thought we had struck the case you had in mind.

Mr. MATTHEWS. There are two tax cases and another valuation case in the 175th Massachusetts.

The CHAIRMAN. He has gone out to get it.

The WITNESS. I think that is also decided in the Tremont & Suffolk case.

Mr. BROOKS. (To Mr. Cotter.) Is your Honor looking at *Cochrane v. Commonwealth* (175 Mass. 299)? Is that the case you have in mind?

Mr. COTTER. Yes, that is the case. My recollection of that case is this: A mill owner in Watertown, in Middlesex County, who had but an experience in one transaction, was permitted to testify as to the value of a site for mill purposes in Dedham in Norfolk County. He had not bought nor sold land for that purpose, or any other, except on one occasion. He was familiar, however, with the mills, mill rights and mill property, and reading the case now as I remembered it before, the court permitted him to testify as to the value of the mill site on Mother Brook at Dedham.

(The Chairman read at length from the above case, which the stenographer was directed not to take down.)

The CHAIRMAN. It strikes me that this is identical to that.

Mr. BROOKS. If I might be permitted a suggestion, I cannot see that his qualifications are along the line that is stated in that case. I had that case somewhat in mind. What familiarity has he shown with property—that is one of the reasons why that was admitted—used for that specific purpose, as the Courts put it? What familiarity has he shown with like property used for that specific purpose? The witness whose testimony was admitted in this case, and to which objection was made, was a manufacturer right in the same line, with special knowledge as to its adaptability.

Mr. GREEN. I will ask the witness, with the permission of the Court, one or two other questions, although I think it is admissible as it now stands—

By Mr. GREEN.

Q. In the valuation which you have made of the properties enumerated by you in connection with water power valuations, have you valued the land? A. In some of them.

Q. In Massachusetts? A. Yes.

Q. Can you tell us in which of the various instances you val-

ued the land in connection with the water power here in Massachusetts? A. The Smith & Dove Manufacturing Company,—

By the CHAIRMAN.

Q. What? A. The Smith & Dove Manufacturing Company.

Q. Located where? A. Andover, Mass. At Lawrence, Mass., for George A. Kunhardt, and also for the Washington Mills.

By Mr. GREEN.

Q. That was land with the water power? A. Yes.

Q. Whether or not in connection with any of the various plants that you have installed, manufacturing or steam plants, you are familiar with or knew the price paid for the land? A. Yes; I have recently made an investigation of that sort in Lawrence, getting prices for quite a number of sites for a mill.

Q. Mills that have used water power or steam power, or both? A. Both.

Q. Whether or not you have any familiarity with the land in Holyoke arising from your experience in the Lyman Mills? A. No, I don't think I have any personal knowledge of it. I assumed the value of the land in the Lyman Mills case.

By the CHAIRMAN.

Q. You assumed it? You have assumed a certain value of land, haven't you?

Mr. GREEN. That is the Lyman Mills case.

The CHAIRMAN. Oh, the Lyman Mills case.

By Mr. GREEN.

Q. There were two instances in Lawrence, as I understand—one instance where you valued land, or two? A. Two.

Q. And also in Lawrence it is that you have investigated or found the prices of land to be used in connection with steam and water power? A. Yes.

By the CHAIRMAN.

Q. Do you consider that you are familiar with the value of real estate in Holyoke, independent of this question? A. No, sir.

The CHAIRMAN. It certainly saves an embarrassing question here, not only for us but perhaps for the Court later, if the witness could do as he did in the Lyman Mills case, irrespective of the question of right.

Mr. GREEN. He will, if your Honor please, under some other valuations; but this is a valuation for the purpose of its use, and we cannot really separate them. They have got to be aggregated in order to answer that.

Mr. MATTHEWS. I find that the case I desired to call your Honor's attention to was neither of the two that I cited. It is the case of Lowell v. County Commissioners, 146 Mass. 403, and the point of that case will be found quoted, I think correctly, on page 173 of Volume 7 of the evidence in this case.

The CHAIRMAN. Read it, will you?

Mr. MATTHEWS. It is as follows:

"In this case the Commissioners upon the complaint of a manufacturing corporation for an abatement of taxes called a witness who qualified as an agent of the mills and as having been engaged in cotton manufacturing for thirty years, but who had not examined the Company's land, and he was permitted to testify against objection that so much a foot would be the outside price of land in Massachusetts suitable for the purpose of a cotton mill. The action of the Commissioners in allowing this evidence was sustained by the Court."

Now that was the case I cited the other day, and it would seem that the case of Cochrane v. Commonwealth, that Mr. Cotter called attention to, is a decision in the same line. We are entitled as a substantive part of our case, according to our theory of the law, to show what the value of this land is for the purpose of its use, that is, for the purpose of running an electric light plant by water power, and this witness must be qualified to answer this question. Then there may be another question as to whether the land is worth something more for other purposes, which this witness would not be qualified to answer.

The CHAIRMAN. Let me ask this question:

Q. Do you consider yourself qualified to answer this question, that is, to give a fair valuation of the land for the purpose indicated? A. For this purpose.

By Mr. MATTHEWS.

Q. Do you or do you not? A. I do.

By Mr. BROOKS.

Q. For the manufacture of electricity? A. Yes.

The CHAIRMAN. Do you wish to be heard, gentlemen?

Mr. BROOKS. It seems to me that this case of Cochrane v. Commonwealth really precludes this man from testifying.

The CHAIRMAN. Why?

Mr. BROOKS. What familiarity has he shown with the value of land to be used in connection with an electric plant for the production of electricity? In this case, this Cochrane case, the question was specifically admitted upon the theory that the man had an experience with this particular business—this specific business—which was a printing business. How has he shown his familiarity with the sales of land or the use of land for the manufacture of electricity?

Mr. GREEN. He has shown a familiarity with the value of land in places which we have accepted as being very similar in condition, that is, at Lawrence, for the purpose of being used in connection with water to produce power. He has personally sought prices to see what land could be bought for, and he has also testified and formed a valuation.

Mr. MATTHEWS. I would like to call your Honor's attention to this fact, that what the witness is really asked to do is to value this land as a site to be used in connection with a water plant for the development of power by water. I think perhaps Mr. Brooks' last statement put a little different light upon the case, and a light in which we should not care to have the matter rest. This witness is called upon to value the land as a site for the production of a certain quantity of power by water; whether that power is to be run through electrical machinery or not may be a different question.

Mr. COTTER. Does he know what was paid for land for such purposes in other places in Massachusetts?

Mr. MATTHEWS. Suppose there were no other places.

Mr. COTTER. Well, I don't know. There may have been.

The CHAIRMAN. He says he is familiar with the price of land for manufacturing purposes. I will ask this:

Q. Do your relations to any of them involve the valuation of land for electric purposes—an electric plant? A. No, sir. One of the lots is next to the electric light station.

The CHAIRMAN. Doing the best we can, Mr. Cotter and myself think that the evidence better be admitted, appreciating the fact that while he has not testified to any specific knowledge of this business, yet that he has made himself familiar, practically, though perhaps in another way from the witness who testified in *Cochrane v. Commonwealth*. It is true he is not in the business. It is true he has not been involved in a case where land has been bought for this purpose. But he states that he has made himself familiar with the going price of land for manufacturing purposes, and it is my impression—

Mr. BROOKS. Three instances, I think.

The CHAIRMAN. It is my impression that that goes to the weight of it. We will admit it.

Mr. BROOKS. We would like our exception saved to any line of testimony that involves from this witness any valuation of the land.

The CHAIRMAN. Yes.

By Mr. GREEN.

Q. Will you state, in your opinion, what is the fair market value of the land and water power privilege and the water power of the Holyoke Water Power Company, used in connection with its electric light business, for the purpose of running an electric light station, with a right to draw up to 16 mill power, and paying for the water drawn and measured at the rate of \$1500 per mill power per annum? A. \$50,000.

Q. Will you state the total value of the water power plant, steam plant, water privilege and land, for the purpose of an electric light station, assuming the right to draw up to 16 mill power, and paying for the water measured at the rate of \$1500 per annum per mill power?

Mr. BROOKS. That, I suppose, comes in under our same objection.

The CHAIRMAN. Yes.

A. \$145,891.90.

Q. Laying aside a moment the question of its use in connec-

tion with an electric light station, and dealing with this water power generally, what have you to say as to the size and shape of the land offered, in connection with the amount of power offered, as affecting its utility for general manufacturing purposes?

Mr. BROOKS. I object to it.

The CHAIRMAN. We think that is competent.

A. The amount of land is small for the amount of power which is supposed to go with that land. The shape of the land is irregular and is not very convenient or suitable for erecting a building for manufacturing purposes.

Q. Assuming that there was a sufficient area of land, what in your opinion is the fair market value of the water power, of the 16 non-permanent mill power, which is offered in this case? That does not include any valuation of land. It simply assumes that you have an area large enough to use it, and it does not include the water plant.

Mr. BROOKS. It simply includes water power.

Mr. GREEN. Water power.

A. \$825 per mill power per year if nothing were paid for the land, or \$600 per mill power per year if \$4500 were paid per mill power for the privilege accompanied by the usual area of land.

Q. In the first valuation of \$825 per mill power per year, you make that valuation on the supposition that nothing was paid for the land? A. Land and privilege.

Q. Land and privilege. Nothing was paid for the land or privilege.

Mr. BROOKS. That is, no bonus.

Q. These last two valuations, I understand, are not for any particular purpose as in connection with an electric light station, but general valuations for mill purposes? A. This is for a paper mill that runs 24 hours a day.

Q. You say that is for a paper mill? A. That is for a paper mill that runs 24 hours a day.

Q. Then, if I understand you aright, that is for any industry that uses its power continuously?

Mr. BROOKS. I object to that question—that form of questioning. He has stated it and I object to the summing up every time.

Mr. GREEN. Very well, you needn't put it in.

Q. Just tell us what you mean by saying "for a paper mill," using that as an illustration? A. For any purpose such as a paper mill that runs six days in the week, 24 hours a day.

Mr. BROOKS. This testimony is being given from a schedule here, isn't it? Cannot we have one?

Mr. GREEN. We will offer it when we get to it.

Mr. BROOKS. Well, we have always put ours in early, if not often.

Q. What in your opinion is the fair market value of the land, water power privilege and water power, for the purpose of running this electric light station, on the supposition that \$72,000 is to be paid as bonus and \$24,000 per annum rental?

Mr. BROOKS. This is under our exception—all this.

Mr. GOULDING. That certainly goes beyond the Cochrane case.

A. It wouldn't have any value for this purpose.

Mr. BROOKS. Wait a moment. Is this question admitted, your Honors?

The CHAIRMAN. How much did you say, Mr. Witness?

The WITNESS. It wouldn't have any value for this purpose.

Q. What would you say as to the fair market value of the same that you have just spoken of, if \$72,000 must be paid for the privilege and \$12,000 per annum rental for 8 mill powers? A. It would then not have any value for this purpose.

Q. On the supposition that \$36,000 must be paid for the privilege and \$12,000 rental? A. It would then not have any value for this purpose.

Mr. GOULDING. The same number of mill powers?

The CHAIRMAN. No, 8 mill powers.

Q. Whether or not you have prepared schedules which set out the various valuations and your reasons for them? A. I have.

Q. Whether or not this is the schedule prepared by you? A. It is.

Mr. GREEN. (To the stenographer.) Will you mark this? (The schedule of Mr. Main was introduced and marked "Exhibit 159, W. L. H.")

Q. Mr. Main, will you tell us in a general way how you arrived at the values which you have given us, and the reasons employed by you, starting with your first valuation of \$60,920.40?

Mr. BROOKS. Would you have any objection to informing us of the page?

Mr. GREEN. I suppose he will come to page 2. I have started with the first valuation on page 1. I asked him to tell us how he arrived at that valuation.

A. On page 2 is given the valuation of power plants, including buildings for the same. Water power plant: Column 1 shows the items, or different parts of the plant. Column 2 the estimated cost new in 1898, Column 3 the age in years, Column 4 the per cent. of depreciation, and Column 5 the present value. The racks, head gates and penstocks—the estimated cost new in 1898 is \$6940; the wheel pit and tailrace, \$43,040; wheel room machinery, \$16,370. The average depreciation on those three items is about 13 per cent., and the present value is \$57,700.40. Wheel house, estimated cost \$1970, age 8 years, per cent. of depreciation 8, present value \$1,812.40. Tunnels: estimated cost \$1530, age 8 years, depreciation per cent. 8, present value \$1,407.60. The estimated cost new of the whole water power plant, \$69,850. Present value, \$60,920.40.

Q. Now have you the details for the racks, head gates and penstocks, wheel pit and tailrace, and so on, included in this result of \$60,920.40?

The CHAIRMAN. It is on pages 3 and 4, isn't it?

A. All of the details for the racks, head gates and penstocks, are shown on page 3, and for the wheel pit and tailrace on page 3, and for the wheel house and tunnels on page 4. For the engine house, page 5.

The CHAIRMAN. You are going into the steam power plant now, aren't you?

Q. It is found on pages 3 and 4, as I understand? A. 3 and 4 for the water power plant.

Q. Whether or not you estimated the cost new as of January, 1898? A. I did.

Q. Whose quantities are these? A. They are my own quantities.

Q. And from what plans have you estimated these quantities?
A. From the large roll of plans, blue prints; that is the roll over there.

Q. That is in evidence in this case? A. It is in evidence in this case.

Q. The Water Power Company's plans? A. Yes.

Q. And the prices—whether or not the prices are your own?
A. They are.

Q. Take, for instance, the detail found on page 3, of the racks, head gates and penstocks, a total of \$6,165.90. What does that amount of \$6,165.90 include? Whether there is any profit in it, and if so, whose? A. It includes the cost and contractor's profit.

Q. Where have you figured the profit? A. In the prices of the different items.

Q. That is, the prices which are in the various items as you proceed with them in detail? A. Yes.

Q. It appears here how much you have allowed for engineering and how much for interest?

The CHAIRMAN. 12 1-2 per cent.

Q. In each instance you have added something for engineering and interest during construction? A. I have.

Q. And for supervision also and for contingencies? A. Yes, sir.

Q. And, generally, what have you allowed for engineering, supervision and contingencies? A. 10 per cent.

Q. And for interest during construction? A. 2 1-2 per cent. usually.

Q. In some instances you have allowed— A. 3 per cent. in some.

Q. Have you made your estimate of the steam power plant the same way? A. I have.

Q. You have the details for the steam power plant shown upon— A. Pages 5, 6 and 7. Some of the details for the water power plant are also on page 7.

Q. The wheel room machinery? A. And the shafting in the tunnels.

Q. This wheel house has its wheels set in what way in the

wheel pit? A. The wheels are vertical wheels, set two in a pit, and the power is taken off on horizontal shafts by means of bevel gears.

Q. Whether or not in your opinion that was good construction, considering the fact it was used in connection with this dynamo building?

Mr. BROOKS. How can he express an opinion on that—

Mr. GREEN. Or good engineering construction.

Mr. BROOKS. —without more knowledge than he has shown with reference to the production of electricity? It strikes me it is a little different question from the one your Honors have already admitted. If the evidence is admitted we would like to have our rights saved.

The CHAIRMAN. We will admit it, subject to exception.

A. It was not good construction.

Q. Why? A. Horizontal wheels would have been a better type of wheel to have installed, doing away with the use of bevel gears and saving the loss of friction due to the same.

Q. Will you tell us in what way it would have saved the loss of friction? A. The shafts from the horizontal wheels would go directly into the—could go directly into the dynamo building, without the intervention of bevel gears.

Q. And in your judgment the bevel gears cause what? A. They cause a loss of power and are also a source of annoyance.

Q. Will you tell us generally about this water power development; the things you observed in connection with it, the wheel pit, the wheels, in regard to the structural features. A. The construction?

Q. Yes, as far as it has a bearing upon our understanding of this case. A. Starting at the canal, there is a wooden fender for preventing the ice from getting into the racks. Then come the racks, which are placed on the face of the canal, for the purpose of keeping out leaves and sticks and other debris from the wheels. Right behind the racks are the head gates, two in number, one for each penstock. These are horizontal sliding gates. Then come the penstocks, which are steel tubes, which conduct the water from the canal into the wheel cases. The wheel cases are also steel, and in them are the wheels, through which the wa-

ter passes, passing through guides and through the buckets in the wheels, thus causing the wheels to revolve. Connected with the wheel is the vertical shaft, which comes up through the floor of the wheel house, and on that shaft is a gear called a crown gear. The horizontal shafts from the dynamo building come through the tunnels, and on each one of those is another gear which is called a jack gear, which meshes into the crown gear. Through those gears the power is transmitted to the dynamo building. The water, after passing through the wheels, goes through the draft tubes, which is a piece of iron rivetted to the bottom of the wheel cases, which is cylindrical in shape, into the tailrace. The wheel pits are built of brick, and are separated by a brick partition into two; and in each one, in each pit, are two wheels. From each pit there runs a separate tailrace, of brick and partially of stone, from the wheel pit to the second level canal. Through this tailrace the water from the wheels runs from the wheels to the second level canal.

Q. On these wheels that are in the wheel pit, is there any dial, disk or meter of any kind which shows the amount of water passing through? A. On each of the wheels there is a brass dial—disk, rather—which is graduated into degrees, and there is also a pointer attached to this dial which shows the gate opening of the wheel in degrees on the dial. The dial is graduated to 360 degrees, and the dial is connected directly through gearing to the gate-hoist, so that the amount that the gate is raised is shown and can be read from this dial.

Q. That is, the gate opening, if I understand you aright—I would like to be sure—means the number of inches, for instance, that the gate which lets the water in is open? A. Yes. In the dynamo building there are some scales which show approximately the gate opening in inches. There is a small rod with a string around it that runs a finger up and down on this scale and shows the opening in inches; but on the wheels themselves these dials are attached which show the opening in degrees, and there is a relation between the inches of gate opening and the degrees of gate opening.

The CHAIRMAN. Mr. Green, I should like to ask right here, if it does not interrupt, Is the water after it passes into the second level canal used for power again? A. Yes, sir.

By the CHAIRMAN.

Q. Does the water that comes to the electric plant come from the first canal? A. It comes from the first level and passes to the second.

Q. That is, they use it there for power? A. Yes.

Q. Then it goes to the second? A. Then it is used from the second to the third.

The CHAIRMAN. I thought so, but I did not carry it very well in my mind. Go on, Mr. Green.

By Mr. GREEN.

Q. Having obtained the structural value of these buildings, did you make any study of the amount of power used in the electric light station? A. I did, for the year ending May, 1898.

Q. That is, of the water power, or of the water and the steam both? A. Of the water power.

Q. Were there any measurements that you could find in the electric light station, any electrical measurements that you could find, to show the output? A. No.

Q. From what did you study the output of the station? A. From the records kept by the Holyoke Water Power Company of the gate openings on the wheels of the electric light station, which are taken at different hours on different days, and which are recorded in their office.

Q. These records were records furnished you by the Water Power Company? A. They were.

Q. Will you explain to us how, by the use of these records, you could ascertain the power used during this year? A. These records show the gate openings of the water wheels, and the observations were made once during each day and once during each night. Of course these readings by themselves do not show—taking one by itself would not show what was the opening during the rest of the day; but by plotting all of the readings for a month a very good idea is obtained of the average load on the wheels for that month.

Q. Is that a usual way of ascertaining the average load during an extended period?

Mr. GOULDING. I object. Of what consequence is it what

the average load is? You have got to provide for the maximum load—the peak of the load.

The CHAIRMAN. We do not think it is competent, Mr. Green. We know how he did it.

Mr. MATTHEWS. It is not how he did it, it is how the Company does it.

Mr. BROOKS. We do not do any such thing.

The CHAIRMAN. We know how the Company did it then.

Mr. BROOKS. We say the Company never did it in any such way as that.

Mr. GREEN. I do not think your say-so will prove it; we say they did it. I was asking the witness the very question, if this is the usual—I will strike that out and get at it in this way:

Q. Whether or not you saw other records kept by the Water Power Company? A. I did.

Q. Do you know whether or not this is the method employed by the Water Power Company in Holyoke in keeping track of its surplus water?

Mr. GOULDING. I object.

Mr. BROOKS. The records themselves must be the best evidence, may it please your Honors.

Mr. GREEN. I do not think the records themselves, unless explained, would elucidate the matter very much.

Mr. GOULDING. We will have the records before we have the explanation.

Mr. MATTHEWS. The records are already in the case.

Mr. BROOKS. I beg your pardon; they are not.

By the CHAIRMAN.

Q. Mr. Main, I do not understand it. You are giving us some statement with reference to the way that you ascertained, as I understood you, the amount of horse power that was developed here. Now, how did you go to work to find out that? That is a question that I would like answered. A. The records of the Holyoke Water Power Company do not show the horse power. They show the gate opening of the wheels, the head on the wheels, and they also show the mill powers used.

Q. What did you do with those? A. I copied all those, and then I also had from them a curve or a diagram which showed

the amount of power which was produced on the wheels at different gate openings and from different heads, and from their records and the curve I could ascertain the horse power on the wheels for each observation which they made.

The CHAIRMAN. I understand.

The WITNESS. Then I plotted this for a whole month at a time and was enabled by that method to determine fairly closely what the average load was for that month.

The CHAIRMAN. That is what I understood, also. Now we want to get your understanding—I mean to say, the results that were obtained by you.

Mr. GOULDING. The question I objected to has been withdrawn. To what he is now saying I have no objection.

The CHAIRMAN. Go on.

By Mr. GREEN.

Q. These Company's records, as I understand you to say, show the mill power? A. They do.

Q. Or the various openings? A. They show the mill power used at the electric light station.

Q. Whether or not that is during the entire period covered by these plottings of yours? A. Yes.

Mr. BROOKS. May I be permitted a question?

The CHAIRMAN. Yes.

By Mr. BROOKS.

Q. These readings that you speak of, are they taken at the same hours on every day? A. Different hours on every day.

By Mr. GOULDING.

Q. Different hours on different days? A. On different days, yes.

By Mr. GREEN.

Q. What effect does that have on the result of your work, in your opinion? A. It enables me to tell in a general way what the average load is for the month. I could not tell if the observations were taken at the same time on every day—I could not tell what was the opening at the other hours in that same day; but by taking the readings for the whole month which are taken

at different hours in the different days, I can then plot them and get fairly closely the average load for that month.

By Mr. GOULDING.

Q. That is assuming that at the same hour of different days the power would be the same? A. Yes, sir.

By the CHAIRMAN.

Q. You have a table, may I ask, showing the result of these observations on page 16? A. The result of these observations is shown in that table.

By Mr. GREEN.

Q. To come back for a moment now, to the matter that I was asking you, the records kept by the Company, if I understand you aright, show the amount of water flowing through the wheels at the time the observation is taken? A. They do.

Q. Those records, I suppose, are still at the Water Power Company's office, so far as you know; that is, you left them there? A. So far as I know, they are.

Mr. BROOKS. It has been asserted that they had been put in evidence, but they never have.

Mr. GREEN. We understand they have.

Mr. BROOKS. Not at all.

Mr. MATTHEWS. I will give you the numbers of the exhibits, if you will give me time.

Mr. BROOKS. Very well.

Mr. GREEN. This illustrates one reason, your Honor, why we prefer to go on with our water power case in Springfield, where we could have the records more easily accessible. If those records were here the witness could explain the whole business in five minutes.

Mr. BROOKS. If you had suggested to us anything with reference to the records, you could have had them here.

The CHAIRMAN. Your proposition is as plain as a pike-staff. You took certain things from the records and made up your power for the month. Anybody who cannot understand it must be dense.

Mr. MATTHEWS. We say it is even different from that.

The Company themselves made up the records, as the evidence shows.

The CHAIRMAN. (To the witness.) You say:

"The records of the Holyoke Water Power Co. for the year ending May, 1898, showing the date, hour, gate opening on each wheel, head on wheels and mill-powers of water used were copied. From this data and the diagram referred to above the horse powers on the wheel shaft were determined."

That is on page 11.

Mr. MATTHEWS. We do not say that the witness' schedule is obscure, but we thought that your Honor misunderstood the witness' testimony in assuming that this was his process.

The CHAIRMAN. Why, it is his process.

Mr. GREEN. No, it is the Company's process.

Mr. MATTHEWS. It is the Company's records.

The CHAIRMAN. They have certain records that anybody can read; call it the Company's or anybody's process.

Mr. MATTHEWS. I do not think we understand each other yet. It is the Company's records, all done by the Company itself.

The CHAIRMAN. I understand the witness has utilized the records and given his conclusions. Is not that so?

Mr. MATTHEWS. That is what we think is so.

The CHAIRMAN. I thought that was plain.

Mr. GOULDING. And he has used the records in a way that suits him to reach a certain average result. Whether it is right or wrong is not the question now. It is something that he has invented.

Mr. MATTHEWS. We thought the records themselves show this fact.

Mr. GOULDING. They would show some other fact if you used them in another way.

Mr. MATTHEWS. That is what we are denying. That is why we ought to have the records here.

The CHAIRMAN. You can go forward, of course, assuming that the records are to be produced.

Mr. GREEN. It is admitted, of course, that we can have the records at any time.

Mr. MATTHEWS. Is it possible to have them tomorrow morning, Mr. Brooks?

Mr. BROOKS. We have sent for them. The moment you whispered "records" we sent for them.

Mr. MATTHEWS. We would like to have tomorrow morning all the records and all the papers that were produced by Mr. Sickman and are referred to in his testimony contained in Volume 6.

Mr. BROOKS. Do you say they were put in evidence?

Mr. MATTHEWS. They were used; they were all identified and most of them were put in evidence. If you will give us what was put in evidence and marked as exhibits—

The CHAIRMAN. If you are laboring under a notion that the Commissioners do not understand what the witness is saying, you make a mistake. We think it is as plain as a pikestaff. I do not see the necessity of having those records here. Here it is, all spread out; this man has examined these records and testified practically from them.

Mr. MATTHEWS. Here is Mr. Goulding on the other side who says they do not show anything of the sort.

The CHAIRMAN. That is all right; that is his claim.

Mr. MATTHEWS. The records, if they were here, would enable the witness to satisfy the Commissioners on that point.

Mr. GOULDING. I do not say they do not show what Mr. Main says they show, but I say that by taking the records at some other hour they would mean something entirely different.

Mr. MATTHEWS. We say the records can only be used the way the witness has stated. Mr. Goulding and Mr. Brooks, if you will kindly have the records here tomorrow.

Mr. BROOKS. I have already sent for the records; I cannot do any better.

Mr. GREEN. Let us return to the schedule. I thought perhaps I was being criticised by my friends for the reason that I had not told them that the records ought to be here.

Mr. BROOKS. Oh, no, we were not criticising you.

Q. Have you a copy of the curve here that you have alluded

to, by the use of which the degrees on the hand wheel can be determined from the gate opening or vice versa? A. I have.

Q. In one case you have degrees, in the other case you have inches? A. They are on the same sheet.

By the CHAIRMAN.

Q. It is copied into your schedule? A. Yes, that is a small copy of the same thing.

By Mr. GREEN.

Q. On page 10 is a reduced copy of the same thing? Is that right? A. That is right.

Mr. GREEN. Now I think it is easier to understand this from the large plan. If we put this up here, Mr. Main may perhaps explain it more easily. (The diagram referred to was hung up.)

Q. Will you explain how, by the use of this chart, the gate openings and head are determined? A. This is really a reproduction of the curves which are or were in the office of the Hot-yoke Water Power Company. On the horizontal line are shown, in the first place, the degrees of gate opening. That is, when the gate is opened this dial turns around and shows for different heights a different number of degrees. Now on the vertical scale is shown the gate opening in inches. To illustrate, supposing the gate opening in degrees on wheel B were 100, follow up the 100 line on the vertical scale and pass over here to the left hand, where the gate opening is given, and you will find it is about 5 3-4 inches.

By Mr. GOULDING.

Q. You pass up what? I do not quite understand you. A. For wheel B you pass up to this straight line here.

By Mr. GREEN.

Q. That straight line is marked B, is it not, and represents the wheel B? A. It does; and then go horizontally over to this vertical scale and find that the opening is about 5 3-4 inches. It takes 354 degrees of gate opening for wheel B to open it up 20 inches, which is full gate opening. On wheel C it takes 382 degrees to open it up 20 inches, and wheel A, 385; on wheel D, 392.

Q. Now in addition to giving you the gate opening in inches,

what else does this same curve show you? A. On this same diagram are the curves, showing the horse power of the wheels for the gate openings in inches. For example, supposing the gate opening was 6 inches; pass along this horizontal line until you come to this curve which is marked 18, and then go down to the horizontal scale, and we find that for 6 inches of gate opening and 18 feet head the horse power would be 65.

Q. On which wheel? A. All four wheels are substantially the same as far as power goes for the different gate openings, so that this curve represents the power on any one of the four wheels for its different heads—18, 18 1-2, 19, 19 1-2 and 20 feet net heads.

Q. This curve refers to the head of water that you have? A. Each curve is drawn for a different head of water.

By the CHAIRMAN.

Q. If you get it up here, how much power do you get? A. For the full gate opening and 18 feet head, the wheel would show 260 horse power.

Q. That is, each wheel? A. Each wheel.

Q. That is nearly a thousand? A. More than a thousand. And for 20 feet head about 289 horse power each.

Q. Say that, for instance, you open it at ten? A. Ten, with a head of 20 feet, it would be 157 horse power.

Q. In each wheel? A. On each wheel.

Q. You can run one wheel or three, as you want to? A. Yes, sir.

Q. Or four? A. Four.

By Mr. GREEN.

Q. Are the records of the Company kept in gate-opening inches or wheel degrees? A. The readings are made on the dials in degrees. Those are taken by the gauge readers.

(The diagram which the witness had explained was marked "Ex. 160, F. H. B., Dec. 27, 1900," the title of said diagram being: "Diagram 1. Showing relation between Degrees and Inches of Gate Opening and Horse Powers.")

Mr. MATTHEWS. What we would like to have the other side produce in the morning—of course if they can—are all the

daily records, all the monthly sheets and all the mill power sheets showing the amount of water flowing through the wheels of the electric light plant from June 1, 1897, to June 1, 1898. Also Exhibits 77, 78, 79, 80, 81, 82 and 83 in this case.

(Adjourned to Friday, Dec. 28, 1900, at 10 A.M.)

FIFTY-FIFTH HEARING.

BOSTON, Friday, Dec. 28, 1900.

The Commission met in the Court House at 10 A.M.

Mr. GOULDING. May it please the Court: We think it is our duty to make at this time a suggestion and to urge an objection. There have been put into this case on one side and the other a variety of schedules, which were proper as embodying figures which the witnesses testified to and which explained their views upon the subjects they were dealing with. It has seemed to us for some little time that the schedules which were presented, referring now particularly to the schedules of Mr. Warner and Mr. Blood, especially Mr. Blood,—that these schedules were getting over the line of schedules and were becoming more and more written arguments submitted by gentlemen more or less competent to deal with the evidence in the case. And last night there was handed to us and to your Honors a schedule of Mr. Main, which, of course, we could only hastily glance at while the Court was in session, and which we have inspected more carefully since the adjournment last night. And we desire to enter a vigorous objection to the admission of the schedule for any purpose. It has not the least resemblance in most of its parts to any proper schedule that any expert can put into a case. It is an argument, page after page of it, more or less cogent, upon the issues that are involved in this case. It does not stop with any statement of figures that express the processes and the conclusions of the witness. It proceeds by a line of argument to deal with the questions in the case—in the first place, the questions that are involved in the plaintiff's proposition and the defendant's proposition, and then to a minute criticism of the evidence given on the other side, and drawing conclusions from the premises that are laid down—page after page of that kind of thing. It is a written argument, I say, more or less cogent and more or less answer-

able; but it is a thing that it is not, in my view, within the right of the respondents to present. They cannot call gentlemen here under the guise of mathematical, engineering and other experts, and submit to this Court a series of arguments in writing. There is nothing fair about that whatever. The schedules that we have submitted here by Mr. Horatio Foster, Mr. W. H. Foster, Mr. Robb and the other gentlemen are figures. They are entitled at the top expressing what they are, and they are figures. But here you have an argument; probably you cannot open it at random without striking some argument which is nothing more nor less than a process of reasoning. For instance I open here: I happen to strike page 42 1-2, which is the conclusion of an argument on the evidence of Mr. Henry S. Anderson, and it states in conclusion, after this demonstration, this argument about Mr. Anderson's testimony, of a partisan character purely, extremely partisan character, a conclusion: "If Holyoke is to pay no more for water power than is paid in Springfield according to Mr. Anderson, it can either, first, do this, second, do that." What has that to do with an engineer's opinion? Then there is an argument on Mr. Prichard's testimony, another on Professor Robb's, and so on—a simple argument. Now I say and submit, we strenuously object against the admission of that schedule for any purpose whatever, as being far beyond the proprieties of any judicial hearing. We have but one argument, really, and that is the argument in the close. Of course there is a good deal of interlocutory argument, but it is not to come from experts from the outside cumbering this case with their discussion.

The CHAIRMAN. I know of no principle that allows this, Mr. Matthews, that permits an expert to put in any such matter in a schedule—even the schedule itself, if objected to. You can call your witness to refer to a schedule or anything else he has to refresh his memory, but if it is objected to I do not know of any right that we have to take evidence in writing from this witness.

Mr. MATTHEWS. After the same practice has been adopted in behalf of the other side—

The CHAIRMAN. The other side filed tables; you did not object. If you can point out that they did anything but file tables I will look at it more seriously than I do now.

Mr. MATTHEWS. I understand there are two points; in the first place, your Honor suggests that such evidence as this, whether mathematical or not, whether confined to schedules or figures or not, is admissible only by consent of the other side. Upon that question we say that the other side is concluded; that is to say, assuming that our schedules do not substantially differ in character from those submitted by the witnesses upon the other side, we assert that they are concluded against objecting now.

The CHAIRMAN. They raise no objection on that point, I understand.

Mr. MATTHEWS. If I may pass from that I will then address myself to the objection that has been raised by Mr. Goulding.

The CHAIRMAN. Yes.

Mr. MATTHEWS. I think that we should concede in the main his proposition, that schedules presented by witnesses put upon the stand by reason of their expert knowledge should in the main be confined to such tabulations and calculations as cannot be made by the witness himself off-hand from the witness stand, and as, if thus made, could not be comprehended by either counsel or the Commissioners. These schedules are not, we submit, intended as a substitute for oral evidence, but simply as an aid to its facile comprehension by the bench. It is for that reason that we have sometimes appeared to your Honors to ask our witnesses more questions, perhaps, and to elicit more answers by word of mouth than your Honors may have thought necessary in view of the presentation of these elaborate schedules. We have felt that the schedules themselves were not properly evidence, but simply an aid to the comprehension of oral evidence.

The CHAIRMAN. I have noticed, Mr. Matthews, that in the examination of witnesses whom you have already called, where things have been put in their schedules besides figures, the witnesses have been examined with reference to them.

Mr. MATTHEWS. Yes.

The CHAIRMAN. I think they have been covered in your oral examination, though I may be wrong about it. But of course you agree, Mr. Matthews, if it is objected to, that we cannot take this as evidence other than the figures.

Mr. MATTHEWS. No, sir, I do not agree to that. I am

coming to that in a moment. I agree to the general proposition that lies in my brother's mind, that these schedules are an aid to oral evidence and should be confined as largely as possible to such matters as cannot be explained orally by the witness without their assistance, and that means in the main that they should be confined to mathematical calculations and tabulations. Incidentally, in the case of a complicated calculation, the witness may, it seems to me, be permitted to explain in his schedule discursively the method of calculation; and further than those two propositions we do not care to go. We do not ask to have your Honors admit in the form of a schedule anything which is not in itself a mathematical tabulation or calculation, or which is not a concise statement of the process or reasons upon which the figures are reached or based. We submit that that has been done by the other side to a greater extent, to a more discursive extent, so to speak, than is attempted in the schedule of Mr. Main. Mr. Goulding, for instance, called the attention of the Court to some schedules presented by the experts for the petitioner, and he mentioned in particular Mr. H. A. Foster. I would like to direct your Honor's attention to page 283 of Volume III, in which place for three pages we find what Mr. Goulding would call an argument, a lengthy argument covering three printed pages, of Mr. Foster's theory of depreciation.

Now while it may be described as argumentative in a sense, it did not appear to us to have been intended as such, and it certainly was not so considered by the Commissioners. It is rather an explanation in words of the processes, the methods, adopted by Mr. H. A. Foster in his statement of the question of depreciation. It is almost impossible, if your Honors please, to explain some of these very complicated questions without a resort to discursive language. It seemed to us fairer, when the testimony for the other side was going in, that Mr. Foster should be permitted to explain at length in print, though written by him in advance of his appearance on the stand, the methods and processes he adopted in calculating depreciation.

We understand that the schedules upon the other side either consist of figures purely, or are explanatory statements, such as the three pages in Volume III written by Mr. Foster and incorporated in his schedule, relating to the subject of depreciation,

the discursive or written part of the schedule being confined, and properly, we think, to an explanation of the figures and the processes by which the figures are made up. We do not think that there is anything in Mr. Main's schedule that transcends the limits which I have just defined, but I will go through it. I think your Honor's copy is paged as mine is. Page 1 is a summary, isn't it?

The CHAIRMAN. Yes.

Mr. MATTHEWS. Page 1 is a summary. There cannot be any objection to that. I will then turn over. The following pages are all figures.

The CHAIRMAN. Yes.

Mr. MATTHEWS. Until I get to page 8, and then we have the most complicated calculation that could possibly be put into evidence taken in a court of law, running from pages 8 to 17, inclusive, and relating to the determination of the average load upon the electric light station by means of the records kept by the Holyoke Water Power Company of the gate openings for its water wheels. It is an extremely complicated matter. Of the ten pages, from 8 to 17, which relate to this matter, most of them, as your Honors will see, are occupied with diagrams and figures. There are, however, some written sentences explanatory of the process, and without those written sentences it would be impossible to follow the schedule.

The CHAIRMAN. Right here, Mr. Matthews—

Mr. MATTHEWS. Yes, sir.

The CHAIRMAN. Take that as an illustration. Why cannot Mr. Main, if it is objected to—I am not saying that is my own view of the practicability of this—but as to pages 8 to 17, what is there about that that Mr. Main cannot explain without putting in his schedule? Why can't he testify from the stand?

Mr. MATTHEWS. Look at all the figures, tables and diagrams.

The CHAIRMAN. Yes. I have seen expert after expert sit and read statements they have already prepared.

Mr. MATTHEWS. If there is no objection to his reading it we shall be perfectly content to have it go in in that way.

The CHAIRMAN. Well, referring to it in such a way. Go right on.

Mr. MATTHEWS. The written part of these 10 pages is confined, we think, to a condensed statement of the data, the reasons and processes, which he adopts, and without them we think the diagrams themselves would be entirely unintelligible.

The CHAIRMAN. He is an expert, assumed to be familiar with these propositions he has undertaken to give here. What I am trying to get at is whether we can let this evidence in if objected to, whether we can refer to it ourselves, whether it can be made part of the record, excepting through his lips.

Mr. MATTHEWS. Yes. Now if your Honor will let us go through it. If the Commissioners desire it re-formed, we can re-form it, and we can conform to anything the Commissioners desire, but I would like to go through it first. On page 18 there is nothing anyone could object to. There are simply assumptions of data which he uses.

Mr. GOULDING. There is a statement on that very page, or page 19.

Mr. MATTHEWS. I haven't got to page 19 yet, Mr. Goulding.

Mr. GOULDING. In the first place, on page 18 there is a statement of what there is in the lease, a construction of the lease.

Mr. MATTHEWS. Those are data which the witness uses.

Mr. GOULDING. He hasn't any business to construe a written instrument.

Mr. GREEN. It isn't a legal construction, it is his assumption.

The CHAIRMAN. It is an assumption, I suppose.

Mr. MATTHEWS. How can the witness explain, for instance, the way in which he treats the use of water power, which is the heading on page 18, without stating the assumptions of fact which he proceeds upon?

Mr. GOULDING. How can anybody who is going to give an argument begin better than by stating his general propositions? and that is what this gentleman does.

Mr. MATTHEWS. We do not ask the Commission, of course, to take these statements of Mr. Main on page 18 as proof of the fact. It is simply a statement of what Mr. Main assumes to be facts for the purpose of forming his opinions. Page 19 perhaps might be considered discursive.

Mr. GOULDING. He talks about "the strict interpretation of their leases" on the top of page 19.

Mr. MATTHEWS. So far as the interpretation of a lease forms one of the data which the witness uses, it stands with the rest of the data which he thus uses. Now I pass along. From page 20 on your Honors will see there are practically nothing but schedules and figures upon various assumptions, which have to be stated in words or the figures themselves become meaningless. On page 27 there may be a little that is discursive, which could be perhaps as well testified to orally as put in the schedule itself. It might be impossible to omit those. But the conclusions on page 29, etc., are what he is leading up to all the time, and the figures themselves would be meaningless unless the conclusions were stated too. Then on pages 31 and following we have the conclusions of value on various assumptions. On page 33 is what Mr. Goulding has characterized as a criticism of the evidence in the case. It is not intended that way at all. I suppose that my colleague would have asked the witness, if he had been permitted, what would be the result of assuming certain figures testified to by Mr. Prichard, and on pages 33 and 34 you will find the process by which the witness works out a result based upon data found in Mr. Prichard's testimony. It is not a criticism of Mr. Prichard's testimony in any sense.

The same thing is true of Table VII on pages 35 and 36.

Section VIII, on pages 37, 38 and 39, and Section IX, on pages 40, 41, 42 and 43, relate to the value of water power at Holyoke, based upon the prices paid at Hartford and at Springfield. The seven or eight pages of the schedule devoted to an analysis of these problems is not a criticism of the testimony of Robb or Anderson in any sense. They are simply computations founded on the data testified to by these gentlemen, accepting them to be true and to be taken at their face worth. It would be impossible to condense those, we think.

The rest of the calculations relate to a comparison of the cost of running the plant by steam and water power, and to the cost of a certain quantity of power if produced by steam, and are not substantially different from those which have been given by the witnesses for the Company.

We do not think that your Honors can read that schedule

through, and compare it with Mr. H. A. Foster's schedule on depreciation, and reach the conclusion that we have asked Mr. Main to put anything in his schedule, or to make his schedule on any different basis, than that adopted by Mr. Foster; not an argumentative, but a discursive statement of his reasons, which discursive statement, we submit, is almost essential to an understanding of the figures themselves. I think, also, your Honors will find that some of the other witnesses for the Company were permitted to accompany the figures in their schedules with some written and explanatory statements, to which we made no objection. We think work of this kind assists not only the Commission, but the other side, in comprehending the meaning of the witness's testimony and the nature of the processes adopted by him. The whole case, particularly the subject upon which this witness is being examined, is extremely difficult and technical, very complicated and involved; and it is almost inconceivable that it should be understood by anybody, we think, in all its details, without the aid of schedules which contain not only figures but written explanations. We think the same privilege should be extended to us as was extended to the other side, and this schedule should be permitted in this form. If not, if the Commissioners think the schedule is in parts too discursive, we would like to have those portions designated, and we should like to have the opportunity of submitting a remodelled schedule in accordance with the Commissioners' decision.

Mr. GOULDING. We address ourselves, may it please the Court, to the subject of our motion, which is that this schedule is not a competent piece of testimony, and is in many of its parts merely an argument of an extremely partisan character. Now the answer to that is, in the first place, that it is comparable to the schedule of Mr. H. A. Foster, found on page 283 of Volume III. All I have to say about that is, if your Honors can discover any resemblance between the two things at all, why, it would be useless for me to argue it, because I do not know the process of reasoning by which that conclusion can be reached. There is on page 284 a statement of the methods that are adopted for the purpose of showing depreciation; there are three or four paragraphs there. It has no relation to this case whatever. It is a statement that is thrown in as to what methods are adopted by experts in

that matter, for the purpose of showing depreciation. Then towards the end of the schedule, on page 285, there is a statement that "If the City of Holyoke should undertake to build a new plant independently, then, assuming that it could be built complete ready for business in one year, and giving no consideration to the fact that it would take some time to get business that would return an income, then the one year's income as at present could be considered as a part of the value of the plant itself, and this would nearly offset the charge for depreciation." Then follow some figures. Now I should think, strictly, that that was perhaps going a little beyond the functions of a schedule; but it is a mere trifle, a mere bagatelle, a mere shadow of something, as compared with this substantial thing that has been evolved here by Mr. Main and stated in the form of an elaborate argument.

But, in the second place, the fact that incompetent testimony was admitted in Volume III without objection is no argument in favor of admitting incompetent testimony in Volume IX, to which there is an objection. Now this gentleman has, on several of the pages that have been referred to, undertaken a construction of the lease. Perhaps as striking, though in substance no different, an example of this kind of reasoning is found on page 30 of the schedule, where the learned counsel, one would suppose—as he is, of course, a very effective and learned counsel in this instance—undertakes to give the effect of a strict interpretation of the lease. "Effect of Strict Interpretation of Lease," is the subject.

"It is probable that if not at present, at some future time the lease will be strictly interpreted, and that the use of water at the electric light station will be postponed until all who now have legal rights in the first and second canals and 50 per cent. in addition is supplied, which will increase the days of restriction. Each day of restriction with the present plant makes a net increase in expenses of \$23.45 a day. \$23.45 each year is the increased cost of running for every day of postponement in that year. \$23.45 capitalized at 5 per cent. equals \$469, which represents the reduction in value of the water power privilege for every day of restriction."

Now there are difficulties enough in those leases. We have not, on either side, entered upon any attempt to construe them, except in an interlocutory way. But here we have an expert going into the future, and imagining himself standing there at some time when somebody will arise and put a construction on these leases which he says will be a strict interpretation, and then he undertakes to evolve the consequences. How could there be a more ingenious argument? Are my friends on the other side more likely to evolve a more ingenious argument than that is, to precipitate upon the Court here? Of course we have got to meet those considerations when they come from the proper source, but they do not come from the proper source when they come from an expert who is here as an hydraulic and electrical engineer and who is learned in other directions. It is impossible for one man to know so much as my friend the witness seems to assume that he knows; and, besides, it is not proper that an argument should be submitted to this Court by persons outside.

Then he undertakes to compare this with the water at Manchester, and goes on to tell what they sell water up there for, and to construe their contracts up there and then compare it with this. I forget what page that is on, but it is a striking illustration of how completely this witness departs from the true functions of an expert. I think that we have some experts here, if we are going to have an encounter of wits between experts in the shape of argument submitted to the Court, that can meet him. If that is the thing that the Court thinks ought to be done we will undertake to have Professor Robb and Mr. Whitham and Mr. Allen, and two or three others of them, charge on him, and we will have a tournament of argument between these eminent engineers on the one side and the other. But what I am now claiming is that it is not a proper way to treat the case.

The subject that I refer to is found on the 49th page, and is entitled, "Comparison of Water Power with that at Manchester, N. H., Lowell and Lawrence, Mass." It goes on to state what contracts they make up there with reference to water, and reaches some conclusions more or less relevant to this case if competent.

Now we have stated our position about it. Of course if this was a jury that did not know how to distinguish between proper and improper evidence, it would be very much more important

than it is. But we want it understood that we object to that schedule on the ground that it is not properly a schedule but an argument. If in any view it is to be admitted for any purpose, then we want the privilege of submitting counter arguments.

The CHAIRMAN. Mr. Goulding, up to the 8th page there does not seem to be any difficulty. There is a schedule of figures up to the 8th page. It seems to me that that is all right.

Mr. GOULDING. We cannot object to figures.

The CHAIRMAN. Pages 8 to 17 relate to the load on the electric light station. We had gone into that partly last night. Now perhaps it would be well enough to deal with these things one at a time, Mr. Matthews, and why not take your witness on the load on the electric light station and let him go ahead and be examined, and take your diagrams. He can refer to any writings he has; he can make any explanations he has a mind to. That is all put down. Why not try that way, so long as there is objection? I do not know of any rule—I will give you the benefit of my experience. In three cases that I have tried in the last three or four years, where I think there must have been at least five hundred schedules put in—I do not think I am exaggerating—I do not remember now of a single schedule that contained anything but figures. Now I may have forgotten—I may be wrong about that; but this case seems to have incorporated for the first time these elaborate statements in connection with the figures. Doubtless it is a very convenient way, and would doubtless be of help to us, but we are now dealing with the competency of this thing. It seems to me the best way is to see what you can do with your witness on this very question of the load on the electric light station. Let him take his diagrams, his figures, anything he pleases, and go ahead and be examined on this line.

Mr. MATTHEWS. Then how much of this schedule is in and how much is out?

The CHAIRMAN. I cannot say. The first eight pages I understand are not objected to.

Mr. MATTHEWS. I think the practical difficulty with following that suggestion would be that probably my associate has prepared his line of examination with reference to this particular schedule and, the subject being immensely complicated and involved and there being so many different branches of it, it might

throw him out very considerably if this schedule were to be rejected in its entirety or in part. I think there is a good deal of force in Mr. Goulding's objection. I think if we had started in to try this case according to the strict rules of law and evidence, perhaps the schedules on both sides would have been restricted to figures. But that was not done by the other side, and we had not supposed that we should encounter any objection to our witness stating all this witness has stated, namely, not arguments but the reasons he has used. If he has made a false assumption of the meaning of the statute, that is the fault of counsel who instructed him and not his fault.

Practically, I think if your Honors are going to limit this schedule, going to cut out any portion of it, I think your Honors ought to allow Mr. Green to elect whether to proceed with the witness at the present time with this remodelled schedule, or to allow him to suspend until he can have the schedule put in such shape as will be acceptable to your Honors and to the other side. I have not consulted with him about the matter, but I know from the hours that he has devoted to a consideration of these very difficult problems that it would be difficult for him to examine the witness effectively if this schedule is to be interrupted.

The CHAIRMAN. How do you feel about it, Mr. Green?

Mr. GREEN. I feel this way about it: I would state a word about the "why" of this, which I think is apparent. I did not look upon this as an argument, as it impressed Mr. Goulding. I looked upon it as a full and complete statement of the witness' reasons, so that the Commission, or counsel on the other side or anybody who saw his results, would know why he arrived at those results, and the Commission could criticize more readily, the other side could examine more readily, and it would be a more compact way of getting at it. Now, if I have erred, and in the opinion of the Commission some portion of this appears to be argument and ought not to go in, I would earnestly request the Commission to suspend at this point, and allow us to re-form the schedule. We regard this testimony as of the highest importance, and my whole line of thought as formed in my mind was on the basis of the arrangement shown here, and if it is to be changed, there are certain changes which I desire to make in the form of presentation to accommodate myself to the difference.

The CHAIRMAN. That is, you want, on the chances that another schedule will be allowed, to go ahead as if there was no schedule now?

Mr. GREEN. Yes, that is it exactly. I say I want to suspend at this time, and re-arrange it. It is clearly understood. It is not this Commission I am looking forward to—this Commission would follow it readily, but it would go into printed evidence in an unfortunate shape, and I want to put it in another way. In other words, I could present certain tables, and then go on and present oral evidence on those tables, and I could in effect put the same thing in that is in this form here.

The CHAIRMAN. I think, if counsel make such a request as that, we ought to agree to it, don't you, Mr. Goulding?

Mr. GOULDING. I have not criticised the suggestion at all; I have not thought about it at all. It has an air of reason about it, certainly.

Mr. MATTHEWS. It is understood, then, that the schedule is to be re-formed before the next hearing.

I would like to say this, that while we should now object, that is, if your Honors let this schedule in, to the expert witnesses on the other side replying by means of schedules they might have put in in the first instance, we should not have objected, I think, to the introduction by Mr. Whitham and Prof. Robb of discursive schedules in the first instance. I should have liked it very much, for instance, if Prof. Robb had worked out the value of his Hartford water power as applied to Holyoke conditions. I should like to see it done mathematically, and we could have had it if he had done it in that form. It would be a great deal easier to cross-examine, and it might also aid the Commission. I do not think we should object to this form of schedule, but inasmuch as the other side objects to it, if the Commission thinks there is any doubt about it, we would like to re-form it.

The CHAIRMAN. (To Mr. Green.) Can you go on with any other evidence?

Mr. GREEN. I have nothing further today.

The CHAIRMAN. We will return to you the schedule, and as to the one that has been marked, you can do as you please about that.

Mr. GREEN. (To the stenographer.) You will keep the copy that was marked.

The CHAIRMAN. Now, as I understand, we meet later in Springfield when we do meet, and I will write a letter to Judge Pierce today, if it will help you out.

Mr. GREEN. I should appreciate it very much if you would do that.

Mr. BROOKS. I think it will need a communication from the entire Commission.

The CHAIRMAN. Well, I will ask them all to sign it, if it will accomplish anything.

(Adjourned.)

FIFTY-SIXTH HEARING.

SPRINGFIELD, Tuesday, March 12, 1901.

CHARLES T. MAIN, *resumed.*

Direct examination by Mr. GREEN, continued.

Mr. GREEN. I should like to offer, in the form of a schedule, for the purpose of having them in a compact form, a summary of the values which have been stated.

The CHAIRMAN. Upon both sides so far?

Mr. GREEN. No, by Mr. Main. Mr. Main gave some six or seven values upon different hypotheses, and I should like to offer a summary of them in schedule form.

The CHAIRMAN. Very well. This is a mere boiling down of what he has stated up to the present time?

Mr. GREEN. Yes. It is offered merely as a matter of convenience.

The CHAIRMAN. I do not think it will be objected to. If it is, the gentlemen can call our attention to it later.

Mr. GREEN. If there is no objection, then, I would like —

Mr. GOULDING. We have not looked at it yet. We do not know whether we shall object to it or not.

Mr. GREEN. Oh, excuse me.

(Counsel for petitioner examined the schedule.)

Mr. BROOKS. We desire, may it please your Honors, to save our objection with reference to his capability to testify to the value of land in the city of Holyoke.

The CHAIRMAN. I do not suppose we should assume that he had capacity as a real estate expert to testify to value.

Mr. BROOKS. Of course, we argued that at some length some months ago.

The CHAIRMAN. All right, we will let it stand.

Mr. GREEN. There is no objection to the schedule as such, if I understand, Mr. Brooks?

Mr. BROOKS. No.

(The schedule, entitled "Schedule 1, Summary of Values," was marked "Exhibit 161, F. H. B.," being as follows:)

[EXHIBIT 161.]

SCHEDULE I.

SUMMARY OF VALUES.

1. FAIR MARKET VALUE OF WATER POWER PLANT.
Including racks, head gates, penstocks, wheel pits, tailrace, wheel house, tunnels, and machinery, but not including land and water privilege \$60,920.40
2. FAIR MARKET VALUE OF STEAM PLANT.
Including engine house, boiler house, chimney, and machinery . . . \$34,971.50
3. FAIR MARKET VALUE OF LAND, WATER POWER PRIVILEGE, AND WATER POWER.
For the purpose of running an electric light station \$50,000.00
cash, with the right to draw up to 16 M.P., and paying for the water as drawn and measured at the rate of \$1,500 per M.P. per annum.
4. TOTAL VALUE OF WATER POWER PLANT, STEAM PLANT, WATER PRIVILEGE, AND LAND.
For the purpose of an electric light station \$145,891.90
With the right to draw up to 16 M.P., and paying for the water as drawn and measured at the rate of \$1,500 per M.P. per annum.
5. FAIR MARKET VALUE FOR ANY OTHER PURPOSE, AS A PAPER MILL.
For 16 non-permanent M.P.'s, with a sufficient area of land.
\$825 per M.P. per year, if nothing were paid for land.
\$600 per M.P. per year, if \$4,500 were paid per M.P. for privilege, accompanied with usual area of land.
6. FAIR MARKET VALUE FOR ANY OTHER PURPOSE, AS A TEXTILE MILL.
Assuming a sufficient area of land, would be less than for paper mill purposes; for these, as a rule, are run only 58 hours a week.

ASSUMPTIONS.

I. In determining the value of the plant and privilege, it has been assumed that there is and will not be any greater advantage in the use of direct connected units than existed in June, 1898.

II. It has also been assumed that the combined plant, steam and water, does not cause any extra labor in the dynamo room or on the shafting, belting, etc., above that required for a plant with steam power alone.

Q. Mr. Main, in connection with the testimony that you gave at the last hearing on the valuation of the power plants, including buildings for same, have you prepared now a separate schedule containing the details of your valuation? A. I have.

Q. And will you let me take that work? (Papers produced by witness.)

Q. And are the figures herein set out in Schedule 2 the same figures concerning which you testified at the last hearing?

A. They are.

Q. They are the identical figures? A. They are.

Q. With the same estimated cost, new, the same depreciation, the same per cent. depreciation, and present values? A. No change whatever.

(Copies of the schedule were given to counsel and the Commissioners.)

Mr. GOULDING. I suppose the question of admissibility of the schedule is to be considered?

Mr. GREEN. I offer Schedule 2.

The CHAIRMAN. We do not treat any of these schedules as competent evidence, but as aiding everybody. You do not object to it because it is a schedule, I suppose?

Mr. BROOKS. Oh, no.

Mr. GREEN. This is purely a schedule of figures: there is nothing else in it.

The CHAIRMAN. Yes.

Mr. BROOKS. If that is so, there will be no objection.

(The schedule was marked "Exhibit 162, F. H. B.," being as follows:)

[EXHIBIT 162.]

SCHEDULE 2.

VALUATION OF POWER PLANTS, INCLUDING BUILDINGS FOR SAME.

	Estimated cost new in 1898.	Age in years.	Per cent. of depre- ciation.	Present value.
WATER POWER PLANT:				
Racks, head gates, and penstocks,	\$6,940	8 } about	13	\$57,700.40
Wheel pit and tailrace	43,040	8 }		
Wheel room machinery	16,370	8 }		
Wheel house	1,970	8	8	1,812.40
Tunnels	1,530	8	8	1,407.60
	\$69,850			\$60,920.40
STEAM POWER PLANT:				
Boiler room machinery	\$8,460	7	35	\$5,499.00
Engine " "	10,000	7	14	8,600.00
Piping	2,550	7 about	25	1,909.50
Engine house	9,790	7	14	8,419.40
Boiler " "	4,860	7	14	4,179.60
Chimney	7,400	7	14	6,364.00
	\$43,060			\$34,971.50
EXPLANATION:				
A. For the purpose of determin- ing present value the following subdivision was made of the water power plant:				
Tailrace, wheel pit, wheel house, and tunnels	\$46,540	8	8	\$42,816.80
Feeders, cases, supports, and shafting	14,080	8	16	11,827.20
Fender, racks, head gates, wheel, gears, and governors	9,230	8	32	6,276.40
	\$69,850			\$60,920.40
B. Piping in engine room . .	\$1,200	7	14	\$1,032.00
" boiler "	1,350	7	35	877.50
				\$1,909.50

ESTIMATED COST OF WATER POWER PLANT.

RACKS, HEAD GATES, AND PENSTOCKS.

Excavation, 1,085 cu. yds. @ 30c. a yd.	\$325.50
Canal wall taken down, 262 cu. yds. @ \$1 a yd.	262.00
Puddling, 207 cu. yds. @ 40c. a yd.	82.80
Back filling, 692 cu. yds. @ 20c. a yd.	138.40
Canal wall relaid, 71 cu. yds. @ \$3 a yd.	213.00
Rubble masonry, 154 cu. yds. @ \$5 a yd.	770.00
Brick work, 5,000 brick @ \$12	60.00
Sheet piling, 8,700 ft. @ \$18	156.60
Hemlock timber, 3,900 ft. @ \$15	58.50
Hemlock, 3-in. plank, 3,200 ft. @ \$15	48.00
White pine, 2-in. plank, 1,100 ft. @ \$25	27.50
Southern pine timber, 4,600 ft. @ \$25	115.00
Two penstocks, including rings and vent pipes, 73 ft. @ \$20	1,460.00
Two head gates	1,000.00
Two racks, 23 ft. 6 in. x 12 ft. = 282 sq. ft. each = 564 sq. ft. @ \$1.15	648.60
Wooden fenders	50.00
Labor, spikes, lag screws, etc.	250.00
Coffer dam and pumping	500.00
	<hr/>
	\$6,165.90
Add about 2½% for interest during construction,	
Add about 10% for engineering, supervision, and contingencies	774.10
	<hr/>
	\$6,940.00

WHEEL PIT AND TAILRACE.

Excavation, 25,000 cu. yds. @ 40c.	\$10,000.00
Canal wall taken down, 343 cu. yds. @ \$1	343.00
Puddling, 1,256 cu. yds. @ 50c.	628.00
Stone filling, 50 cu. yds. @ \$5	250.00
Back filling, earth, 13,400 cu. yds. @ 20c.	2,680.00
Canal wall relaid, 105 cu. yds. @ \$3	315.00
Rubble masonry, 1,850 cu. yds. @ \$5	9,250.00
Cut granite masonry, 7½ cu. yds. @ \$45	337.50
Brick work, wheel pit, 100,000 brick @ \$12	1,200.00
Brick work, tailrace, 628,000 brick @ \$12	7,536.00
Hemlock mud sills, 61,000 ft. @ \$15	915.00
Hemlock 4-in. plank, 86,000 ft. @ \$15	1,290.00
Pine 2-in plank, 32,000 ft. @ \$25	800.00
Spruce sheet piling, 3,000 ft. @ \$18	54.00
Wood arches	55.00
Labor and spikes in lumber	2,100.00
Coffer dam and pumping	500.00
	<hr/>
	\$38,253.50
Add about 12½%	4,786.50
	<hr/>
	\$43,040.00

ESTIMATED COST OF WHEEL HOUSE.

Brick work, 65,600 @ \$10	\$656.00
Door and window sills	56.00
Southern pine timbers, 8,300 ft. @ \$25	207.50
Southern pine plank, 3,200 ft. @ \$25	80.00
Pine roof plank, 7,500 @ \$25	187.50
Doors	24.00
6 windows	36.00
5 windows	25.00
Gravel roof, 2,065 sq. ft. @ 6c.	123.90
Zinc flashing	10.00
Cast-iron wall plates, 244 lbs. @ 2½c.	6.10
Bolts, washers, etc., 224 lbs. @ 3c.	6.72
Painting and whitewashing	36.00
Hardware	15.00
Labor and nails	210.00
Steam and gas piping and pipe railings (\$61.24 Newcomb)	61.24
	<hr/>
	\$1,740.96
Add for interest, insurance, engineering, supervision, and contingencies about 13%	229.04
	<hr/>
	\$1,970.00

ESTIMATED COST OF TUNNELS.

Excavation, 594 cu. yds. @ 30c.	\$178.20
Back filling, 398 cu. yds. @ 15c.	59.70
Flaggers, 597 sq. ft. @ 20c.	119.40
Concrete floor, 655.5 sq. ft. @ 10c.	65.55
Brick work, 62,000 @ \$11	682.00
Southern pine timbers, 107 ft. @ \$25	2.68
Wood arches	12.00
16 shafting piers @ \$15	240.00
	<hr/>
	\$1,359.53
Add about 12½%	170.47
	<hr/>
	\$1,530.00

ENGINE HOUSE.

Excavation, 2,424 cu. yds. @ 30c.	\$727.20
Puddling, 216 cu. yds. @ 40c.	86.40
Back filling, 356 cu. yds. @ 15c.	53.40
Flaggers, 2,045 sq. ft. @ 20c.	409.00
Brick walls, 82,000 brick @ \$10	820.00
99,000 brick @ \$10	990.00
Brick work in engine foundation, 138,000 brick @ \$11	1,518.00
Cut stone in engine foundation	1,058.00
Southern pine timbers, 11,481 ft. @ \$25	287.12

WATER POWER PLANT—C. T. MAIN.

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Spruce plank, 13,700 ft. @ \$18	\$246.60
Pine plank, roof, 18,400 ft. @ \$25	460.00
Top flooring, maple, 5,200 ft. @ \$28	145.60
Finishing lumber, 1,500 ft. @ \$25	37.50
Platform outside	15.00
14 windows and frames @ \$8	112.00
4 windows and frames @ \$8	32.00
2 outside doors and frames @ \$12	24.00
1 outside double door and frame	18.00
1 sheathing door with glass	22.00
Cast iron wall plates, 3,040 lbs. @ 2½c.	76.00
Wrought iron work, 12,000 lbs. @ 3c.	360.00
Slate, 48 squares @ \$10	480.00
Zinc flashing	10.00
Galvanized iron gutter	5.00
Leader	8.00
Painting	40.00
Hardware	25.00
Labor and nails	404.00
Window guards	20.00
Gas, water, and steam pipe and railings (Newcomb, \$171.70)	171.70
	<hr/>
	\$8,661.52
Add about 13% for engineering, superintendence, insurance, interest during construction, and contingencies	1,128.48
	<hr/>
	<u>\$9,790.00</u>

BOILER HOUSE.

Excavation, 350 cu. yds. @ 30c.	\$105.00
Puddling, 147 cu. yds. @ 40c.	58.80
Back filling, 100 cu. yds. @ 15c.	15.00
Flaggers, 1,700 sq. ft. @ 20c.	340.00
Brick work, cement, 44,900 brick @ \$12	538.80
Brick work, lime, 146,000 brick @ \$10	1,460.00
Paving, 19,000 brick @ \$8	152.00
Cement coping, 42 ft. @ 20c.	8.40
Cut stone sills, 21 cu. ft.	48.00
Southern pine timbers, 1,300 ft. @ \$25	32.50
Pine roof plank, 12,000 ft. @ \$25	300.00
Finishing lumber, 1,000 ft. @ \$35	35.00
Wrought-iron work, 16,360 lbs @ 3c.	490.80
Cast-iron work, 880 lbs. @ 2½c.	22.00
Gravel roof, 2,878 sq. ft. @ 6c.	172.68
2 outside doors	50.00
1 outside door, single	12.00
1 inside door, with casing	12.00
1 inside tinned door	20.00
10 box frame windows	60.00

16 monitor windows	\$64.00
Painting	30.00
Hardware	35.00
Labor and nails	200.00
Plumbing (Newcomb, \$35)	35.00
Gas piping (Newcomb, \$3.88)	3.88
	<u>\$4,300.86</u>
Add about 13%	559.14
	<u><u>\$4,860.00</u></u>

ESTIMATED COST OF CHIMNEY.

Excavation, 500 cu. yds. @ 30c.	\$150.00
Puddling, 66 cu. yds. @ 40c.	26.40
Back filling, 328 cu. yds. @ 15c.	49.20
Brick work, 393,000 brick @ \$12.	4,716.00
Flaggers, 766 sq. ft. @ 20c.	153.20
Spruce piles, 121 sq. ft. @ \$4	484.00
Rubble masonry, 168 cu. yds. @ \$5	840.00
Iron work, 5,961 lbs. @ 2½c.	149.00
	<u>\$6,567.80</u>
Add about 12½%	832.20
	<u><u>\$7,400.00</u></u>

WHEEL ROOM MACHINERY.

4 45-in. Hercules wheels	\$4,000.00
Cases and supports, Foster's weight 199,185 lbs. @ 3c.	5,975.55
4 6-in. pedestal boxes @ \$21	84.00
4 5-in. pedestal boxes @ \$16	64.00
4 pairs of bevel gears @ \$360	1,440.00
4 Snow governors @ \$125	500.00
1 extra pair of gears	360.00
Extra small parts	38.00
Piping for pits	8.00
	<u>\$12,469.55</u>
Add about 13%	1,630.45
	<u><u>\$14,100.00</u></u>

SHAFTING FROM WHEELS THROUGH TUNNELS.

250 ft. of 6-in. @ \$4.13	\$1,032.50
10 flange couplings at \$31.70	317.00
16 pedestal boxes @ \$30	480.00
Freight and erection	175.00
	<u>\$2,004.50</u>
Add about 13%	265.50
	<u><u>\$2,270.00</u></u>
	<u><u>\$16,370.00</u></u>

BOILER ROOM MACHINERY.

5 Manning boilers, 5 ft. x 15 ft., set up complete @ \$1,200	\$6,000.00
Smoke flue or breeching, 10,000 lbs. @ 5c.	500.00
1 Deane receiver steam pump, 5½ x 3½ x 5, \$155; setting, \$15	170.00
1 Deane boiler feed pump, 12 x 7 x 12, \$300; setting, \$20	320.00
1 500 H.P. National heater	375.00
1 No. 4 Fairbanks scale, set	100.00
Wheelbarrows and tools	20.00
	<hr/>
	\$7,485.00
Add about 13%	975.00
	<hr/>
	<u>\$8,460.00</u>

ENGINE ROOM MACHINERY.

2 400 H.P. Wheelock non-condensing engines erected	\$10,000.00
Piping	2,550.00
	<hr/>
	<u>2,550.00</u>

Q. Whether or not, Mr. Main, all that you have said heretofore in regard to the valuation of the power plant—that is, the cost of racks, headgates, wheel house, and the other buildings and mechanism with which you dealt—you now say is set out in Schedule 2? A. Yes.

Q. Mr. Main, in order to get at the valuations which you have given concerning the water power, whether or not you made a study at this plant of the amount of water used and the amount of power used in the electric light plant? A. I did.

Q. Whether or not you determined the amount of power on the wheel shaft? A. I did.

Q. And in doing that whether or not you examined the records of the gate openings? A. As shown by the records of the Holyoke Water Power Company I did.

Q. And where did you get those records? A. At the office of the Holyoke Water Power Company.

Q. And are the records that you examined now here? A. They are.

Q. I do not know whether they have been marked for identification or not. (Showing paper to witness.) Are these papers marked "Record of Power Drawn by Mills," the records that you refer to? A. They are.

Mr. BROOKS. Those are copies of the records, aren't they?

The WITNESS. I don't know whether they are the same ones or not, but they have the same figures on them.

Mr. GREEN. You make no question because they are copies, I assume?

Mr. BROOKS. Oh, no.

Q. And in connection with those records of power drawn by the mills, whether or not there were any other records that were furnished you by the Water Power Company?

Mr. GOULDING. These first records are records of gate openings, do I understand?

Mr. GREEN. They are the records of the power drawn.

Mr. GOULDING. As shown by the gate openings?

Mr. GREEN. I will have those explained in just a moment.

The WITNESS. These records I hold in my hand show the gate openings on the different wheels in the electric light station at different times during the month.

Q. That is, the records in your hand are entitled what?

A. "Measurements made at the Mill of Electric Light Plant to determine the amount of water drawn during the month of July, 1897." There are records for the day and night for every month in the year ending June 1, 1898. Each one of these sheets gives readings for every day and every night in the month. The white sheets are for the day readings and the yellow sheets are for the night readings.

Q. Now the sheets that you have last alluded to, Mr. Main, give the measurements of what? A. They show the day of the month and the hour in the day when readings were taken on the wheels. These readings show the gate opening in degrees. They also show the height of water in the penstock and in the tailrace, and the difference between those two shows the head on a wheel. The next column shows the quantity of water drawn through the wheel in cubic feet per second, and the next column shows the total quantity drawn through all of the wheels that were running.

Mr. BROOKS. Well, there are two wheels.

The WITNESS. Sometimes there is one, and sometimes there are four.

Mr. BROOKS. You see it is headed "Quantity Drawn through Both Wheels."

The WITNESS. You will see on the left hand side of the sheet are the records of wheels A and B, and on the right hand C and D.

Mr. BROOKS. I see.

Q. Now what is the second sheet, or the one that was produced first, entitled "Record of Power Drawn by Mills"?

A. This is something that was made up from those. The other set of records is headed "Record of Power Drawn by Mills during the Month of June, 1897." There are sheets for the day and night of each month in the year ending June 1, 1898. On these sheets are shown the quantity of water drawn by different mills, and in the second mill from the bottom of the sheet is the electric light plant.

Mr. GOULDING. It isn't the same on all of them, I think.

The WITNESS. On the white sheet, the day sheets, the amount drawn by the electric light plant is the second one from the bottom. On the night sheets it is the second one from the top. This record shows for each day in the month the available head on the wheels, the cubic feet of water per second drawn —

Mr. BROOKS. Where does that show?

The WITNESS. —and in red is shown the total cubic feet of water drawn by all the wheels. The bottom column, the final column of figures, shows the equivalent mill powers of water drawn.

By Mr. GOULDING.

Q. Where is that shown? A. The last row of figures.

Q. Under the red? A. Yes, sir.

Mr. GREEN. I should like to have these various sheets marked for identification; not to be printed or put in with the evidence, but to be marked, to be used if necessary.

The CHAIRMAN. All right.

Mr. BROOKS. Well, get them in their order.

Mr. GREEN. I will ask Mr. Winchester to arrange them in order first.

By Mr. GREEN.

Q. As I understand it, the larger sheets, the one we alluded to first, give us the mill power used at the different readings?

A. They do.

Q. And those readings were taken how many times a day?

A. Taken twice during the 24 hours, once during the time between 6 A.M. and 6 P.M., and once in the night, between 6 P.M. and 6 A.M. They were taken at different times, different hours in the different days.

Q. Tell me in your own way how, with the assistance of these sheets, you found the power used at the electric light station. A. I also obtained from the Holyoke Water Power Company a curve which shows the relation between the gate opening and the horse power on the wheels, and also information or diagram which shows the relation between the degrees of gate opening and the inches of gate opening. That information was reproduced on Exhibit 1, which is now in the case and which was explained.

Q. Exhibit 1? A. We called it at that time Exhibit 1.

Q. I will put that in again. You found first the relation between the degrees of gate opening and the gate opening in inches?

Mr. GOULDING. Degrees on the wheel, I suppose you mean?

The WITNESS. On the dial.

Q. Have you a schedule which shows that relation? A. I have: Schedule 3.

Mr. GREEN. Is there any objection to Schedule 3?

Mr. BROOKS. No.

(Schedule 3 was marked Exhibit 163.)

[EXHIBIT 163.]

SCHEDULE 3.

RELATION OF DEGREES OF GATE OPENING TO GATE OPENING IN INCHES AND HORSE POWER OF WHEELS.

Wheel A.— 385° on dial = $20''$, or full gate opening.Wheel B.— 350° on dial = $20''$, or full gate opening.Wheel C.— 382° on dial = $20''$, or full gate opening.Wheel D.— 392° on dial = $20''$, or full gate opening.

<i>Gate opening in inches.</i>	<i>H.P. on $19\frac{1}{2}$ ft. head.</i>	<i>Gate opening in inches.</i>	<i>H.P. on $19\frac{1}{2}$ ft. head.</i>
2.75	0	12	189
3	6	13	206
4	28	14	221
5	49	15	235
6	70	16	248
7	92	17	259
8	112.5	18	269
9	133	19	277
10	153	20	282
11	171		

The above table shows the average H.P. of the four wheels.

Q. Will you explain very briefly the meaning of this schedule? A. I found that no electrical measurements had been taken, which would show the output at the station; and I went to the office of the Holyoke Water Power Company and found these records, which show the gate openings of the water wheels at different hours of the day and night, during each month in the year; and I obtained from them also the diagram which shows the relation of the degrees of gate opening and the inches of gate opening and the horse power on the wheels.

Mr. GOULDING. Did you say you got it from them?

The WITNESS. I did. From these records of gate openings and heads, and these curves which show the relation, the various relations, I was able to ascertain the horse power on the wheels for each one of these readings; and I plotted these horse powers on diagrams which are shown on a reduced scale

on blue prints which will be put in presently, and I also plotted them on a large scale on diagrams which I have here. Each one of these readings would not represent anything more than what was happening at the times of readings; but by plotting all the readings taken all the month, at different hours in the day, I was able to ascertain very closely the average power on the station for the month.

Q. Is that all you want to say about that, Mr. Main? A. The diagram showing the relation of the gate opening, the degrees of gate opening and the inches, and the horse power on the wheels, was fully explained at the last session. Shall I go on, Mr. Green?

Mr. GREEN. Yes, if you will.

The WITNESS. There are different periods —

Q. Before you come to that, I would like to — well, you may go on. I will offer the reduced diagram showing the relation between the degrees and inches and the horse powers later, with the other blue prints.

By the CHAIRMAN.

Q. In relation to Schedule 3, at the last it says, "The above table shows the average horse power of four wheels." The second table apparently gives the amount of horse power, the different openings; for instance, "Gate opening in inches, 282 horse power." Does that mean the actual amount, or to each wheel?

Mr. GOULDING. What schedule is your Honor reading from?

The CHAIRMAN. Schedule 3. What does that mean, 282?

The WITNESS. All these four wheels were tested by the Holyoke Water Power Company.

The CHAIRMAN. I understand that; but what do you mean by 282? Is it 282 horse power for the plant, or what?

The WITNESS. No, sir. The tests of these wheels show each one nearly alike in power at the different gate openings. This table shows the horse power, the average horse power of the wheels for these different gate openings; and each wheel will give approximately 282 horse power on a 19½ foot head, with full gate opening of 20 inches.

The CHAIRMAN. What do you mean above that, 383 on the dial, etc.? I suppose I ought to know, but I don't.

Mr. BROOKS. You have company, your Honor.

The WITNESS. On each wheel attached to the gate mechanism there is a brass dial, with a hand on it, which shows the gate opening in degrees around this circle; and when the opening is the full 20 inches, raised up 20 inches, the hand on the dial shows 385 degrees.

Q. What does it mean? A. It really doesn't mean anything, except the gate reader goes there every day, and takes the readings on this dial in degrees; and the Holyoke Water Power Company from their test know how much water is passing through the wheel for that number of degrees of opening.

By Mr. GOULDING.

Q. 385 means that the wheel turned 25 degrees? A. It means the dial goes around the circle once, and 25 degrees more.

By the CHAIRMAN.

Q. Coming back to the other thing, you mean that these wheels as tested by actual use on a 20-inch opening, 19½ fall, will produce 282 horse power? A. The average of the four wheels, and any variation in power between any two wheels was only 3 horse power.

By Mr. BROOKS.

Q. That is, for the four wheels it would be four times 282, or something like 1,128? A. Yes, sir.

By Mr. GOULDING.

Q. Does your last description, "The above table shows," etc., express it exactly? A. I think so.

By Mr. GREEN.

Q. Now, Mr. Main, does that horse power, 282 horse power, 20-inch opening, represent the power on the wheel shaft, available power? A. It does.

Q. Take, for instance, 11-inch gate opening, and 19½ foot head, does that represent 171 horse power on the wheel shaft?

A. It does, on the vertical wheel shaft.

Q. On the vertical wheel shaft? A. Yes.

By the CHAIRMAN.

Q. Do you mean to say that this table giving the height of opening on a certain day, from that you can tell how much horse power was used on all four wheels that day? A. That is it; yes. I made the table from records which I found at the office.

Mr. GOULDING. I do not suppose you mean anything more than what your record shows,—that at that particular time the opening was what you find recorded?

The CHAIRMAN. At that moment.

Mr. GOULDING. At that moment.

By Mr. GREEN.

Q. From these schedules, as I understand, furnished by the Water Power Company,—the charts,—you have found the gate opening, the mill powers that were being used at the time of the readings, and then by means of some chart which was put in evidence in Boston you go a step farther. Now if you will proceed from there. A. Schedule 5 —

The CHAIRMAN. Schedule 4.

Mr. GREEN. This is the new one.

The CHAIRMAN. The last we had was 3.

Q. Is this Schedule 4? A. Yes.

Mr. GREEN. (To counsel for petitioner.) This Schedule 4 you have seen: it is simply a reduced blue print.

The CHAIRMAN. That has already been put in, hasn't it?

Mr. GREEN. The large one was put in evidence. This is simply a reduced print that we desire to have offered. I offer Schedule 4.

(Reduced blue print of Exhibit 160, entitled "Diagram I. Showing relation between degrees and inches of gate opening and horse powers," marked "Exhibit 164, F. H. B.")

Mr. GREEN. I don't know whether your Honors recall how from the use of this chart or diagram the amount of horse power is found.

The CHAIRMAN. I think that was pretty plainly described by somebody, I have forgotten whom.

Mr. GREEN. It has been described. I was not sure whether the Court had it in mind or not.

The CHAIRMAN. It has been described twice, Mr. Turner says.

Mr. GREEN. You have it in mind; very well.

Mr. GOULDING. This thing has been described twice?

The CHAIRMAN. Yes.

Mr. GREEN. Perhaps, in order to clear up any question, Mr. Main could tell us how from the use of this Schedule 4 the amount of horse power is determined.

The CHAIRMAN. You do not need to go through it for our benefit: we understand it.

Mr. GREEN. I was not offering it for the information of the Commission, but for the benefit of counsel.

The CHAIRMAN. Mr. Cotter and myself do not understand the technical detail of it, but we understand it generally.

Mr. GREEN. I was only asking for the explanation on account of a remark by counsel on the other side.

Mr. BROOKS. I do not claim to remember it all; but, unless Mr. Goulding wishes it explained, you need not go over it.

Mr. GOULDING. If it has been put in, I do not care myself.

The CHAIRMAN. It is a sort of check to Schedule 3, as I understand it: if you understand one, you understand the other.

Mr. BROOKS. It is Schedule 3 merely plotted out, isn't it, Mr. Main?

Mr. GREEN. It is a development. After using Schedule 3, you go a step further and determine the actual horse power of the wheels on the shaft.

The CHAIRMAN. Yes.

The WITNESS. Schedule 3 shows the same thing in figures as the diagram shows.

By Mr. BROOKS.

Q. You simply plot out Schedule 3? A. Yes.

By Mr. GREEN.

Q. Is this Schedule 4 simply a diagrammatic explanation of Schedule 3? A. The diagram is a development of schedule 3, and from the diagram you can obtain readings that are not shown on Schedule 3.

Q. Well, on Schedule 3 you have first — take, for instance, wheel A — certain degrees on the dial showing so many inches of gate opening. If you applied that to Schedule 4, would you find what is given in the second part of Schedule 3? A. They are both shown on the diagram.

Q. They are both shown on the diagram? That is, using the upper part of Schedule 3, you get the gate openings, and both the gate opening in degrees and inches in gate opening are shown on the diagram? A. They are.

Q. And the horse power is shown on the diagram? A. Yes.

Q. Then they both show the same thing? A. They show the same thing, and from the diagram you can obtain any intermediate readings which are not shown on Schedule 3.

Q. But in the diagram,—this may be leading, but I am asking for my own information,—from this diagram in the same way you could find the horse power on 18 feet, 18½ feet, and 19 feet head, as well as on 19½ feet head? A. Yes.

By Mr. BROOKS.

Q. Let me see. From this diagram you say you can obtain readings that are not shown on Schedule 3? A. Intermediate readings.

Mr. BROOKS. Well,— All right. I don't suppose I ought to ask him.

Mr. GOULDING. Mr. Green, do you understand that those figures at the bottom represent degrees or horse power or both,— 20, 40, 60 feet?

Mr. GREEN. I understand that at the bottom they represent both degrees of gate opening and horse power, according to how they are read, and on the side you have the gate open-

ing in inches. For instance, supposing that you had a gate opening of 160 degrees, you find 160 degrees at the bottom,—you trip me up, Mr. Main, if I do not have this right,—you follow that line right up. Supposing the question is in regard to wheel B: you follow the line of 160 degrees up till it intersects the wheel line of wheel B. You run the horizontal line off to the left, and you see that it is 8.

The WITNESS. About 9.

Mr. GREEN. About 9 inches of gate opening. Now the next question is, What is the horse power? That will depend something on the head. Supposing that it is a 20-foot head,—we will take that because it is the nearest,—you find where that horizontal line intersects the 20-foot head: following the vertical line down from the point of intersection, you read 128 horse power.

The WITNESS. That would then be 136,—somewhere around there.

Mr. GREEN. I meant 136 horse power.

The WITNESS. I would like to say that these curves, or one of them is a reproduction of the curve at the office of the Holyoke Water Power Company, showing horse power on the wheels.

By Mr. GREEN.

Q. That is Schedule 4? A. Yes.

Q. Is it merely a reproduction on a small scale of Exhibit 160? A. Yes, sir.

Q. Which is already in evidence? A. And one of those is a reproduction of the curve which the Holyoke Water Power Company —

Mr. BROOKS. Which one?

Mr. GREEN. This is a reproduction of the one you have in evidence.

Mr. BROOKS. No, he says that one of those curves is a reproduction.

Q. Is not this whole schedule a reproduction? A. I have forgotten which head: 19 feet, I think it is. One of those heads is made up in the same way that this one is.

Q. One of them is? A. Yes.

Q. A 19 foot head, is it? A. I am not sure. 19½ is the head which they used in making up their curve.

Q. I will have to ask you,— we have had so many exhibits that I do not know,— do you know whether the one that the Company has has been put in evidence? A. It has been in the case. It has been in this room.

Mr. GREEN. I understand it has been in evidence.

The WITNESS. I don't know whether it has been put in as an exhibit or not.

Q. Now, Mr. Main, will you, proceeding from the data which you now have, tell us how you work out the power used at this station; that is, give us the method? A. In Schedule 5 is shown the different periods of different loads.

Q. Will you explain Schedule 5, and what you mean by the periods of different loads? A. The periods of time during which certain loads were assumed to be on were as follows:—

A. Day load, long days,— that is, summer time: 6.30 A.M. to one hour before sunset, six days a week.

B. Day load, short days,— that is, winter time: one-half hour before sunrise to one hour before sunset, six days a week.

C. Evening load, ordinary: one hour before sunset to 11 P.M., four days a week.

D. Evening load, maximum: one hour before sunset to one-half hour after sunset, and one-half hour after sunset to 11 P.M., three days a week.

E. Night load, long days: 11 P.M. to one-half hour before sunrise, and one-half hour before sunrise to 6.30 A.M., seven days a week.

F. Night load, short days: 11 P.M. to one-half hour before sunrise, seven days a week.

Q. Why do you divide the days and nights up in this way?

A. I took the testimony of Mr. Samuel Winchester as to the times when the different loads went on in the station, and from that testimony I was able to make up this division of the different loads on the station.

Q. What advantage is this division in the accuracy of your results? A. I used these periods of different loads in order to obtain the average load for a given time. The average horse power for each period was multiplied by the length of period in

hours and by the days in the week for this period, thus obtaining the horse power hours for the week. Dividing the horse power hours by the total hours run in a week gives the average horse power for the time run. Dividing the horse power hours by 168, the total number of hours in the week, gives the average horse power for the 24 hours in the day and 7 days a week.

Q. What I wanted to get at, Mr. Main, was this : whether there is any advantage in the accuracy of the work in studying the problem from different divisions of time ? A. There is, and what I have just said explains that the average was obtained by taking into account the time during which certain loads were run. Now, if that were not taken into account, you could obtain an average of all the horse powers, but it would not be an accurate average : it would be approximate.

By the CHAIRMAN.

Q. Why isn't it approximate, anyway, on your notion ? A. Well, it would not be so near the truth as the method I used.

Mr. BROOKS. It would not be so approximate.

The CHAIRMAN. Perhaps you had better re-explain that : I did not quite understand it.

By Mr. GREEN.

Q. Possibly it would assist in the explanation if you made use of some diagrams. Have you prepared some diagrams here, which show how you plotted it out ? A. I have. (Diagrams produced.)

Mr. GREEN. I have two to offer : each sheet is different.

The WITNESS. Those diagrams show graphically the average loads which were obtained by —

Mr. GOULDING. Diagram 1, you are talking of ?

Mr. GREEN. That would be, calling them schedules : Schedules 6, 7, 8, and 9, would they not ?

Mr. GOULDING. These are marked Diagrams 2, 3, 4, and 5.

Mr. GREEN. They come from the old book. They should be renumbered as Schedules 6, 7, 8, and 9.

Q. Taking any one of these, explaining which one you used,

will you explain how you plotted this out? A. Take Schedule 6, Exhibit 6.

Mr. GOULDING. There isn't any such thing here. How is it on the diagram?

The WITNESS. For June, 1897.

Mr. BROOKS. Is that the one called Diagram 2?

The WITNESS. Yes.

The CHAIRMAN. And Diagram 3 is Schedule 7; Diagram 4 is Schedule 8; Diagram 5 is Schedule 9. Leave those that way. I should think an explanation of one of these would cover all.

Mr. GREEN. Yes. The witness has selected Schedule 6 and has taken the month of June, 1897.

The CHAIRMAN. Yes, all right.

Mr. GREEN. The very first one.

The WITNESS. The horizontal line shows the hours in the day, beginning at twelve o'clock, midnight. The vertical line shows the horse power on the wheel shaft. From twelve o'clock, midnight, to one-half hour before sunrise there is a load on the station, which is represented at different times by the dots which are near the horizontal line, at 180.

Mr. BROOKS. I do not understand it.

The WITNESS. The horizontal line of 180 horse power, about, shows the average horse power on the station from twelve o'clock, midnight, to one-half hour before sunrise. At that time the large load is taken off from the station, and either the station is shut down entirely or there is a very light load; and that load is represented by the horizontal line running from one-half hour before sunrise to 6.30 A.M., and is about 50 horse power. At 6.30 A.M. the day load is put on; and the various horse powers shown during the month, at different hours in the day, are represented by the little dots which follow along on that horizontal line, and the horizontal line is the average of all of those dots or horse powers, and is approximately 88 horse power from 6.30 A.M. to 6.30 P.M. At that time the load is increased and runs up to nearly 300 horse power; and during the ordinary loads of the week, the evening loads, the powers are represented by the dots which follow along the horizontal

line which is just below the 300 horse power. The block above that line represents the three nights of heavy load on the station; and the maximum load at that time is represented by the dots which follow along the horizontal line, at about 420 horse power. The ordinary load continues from 6.30 P.M. to 11 o'clock, and the maximum load from one-half hour after sunset to 11 o'clock. At 11 o'clock the load drops down to the ordinary light load of about 180 horse power, and continues from 11 to 12, midnight, and then, going back to the left-hand side of the diagram, from 12 to one-half hour before sunrise. (Schedule 5 was marked "Exhibit 165, F. H. B.")

[EXHIBIT 165.]

SCHEDULE 5.

PERIODS OF DIFFERENT LOADS.

The periods of time during which certain loads were assumed to be on are as follows:—

- A. Day load, long days, 6.30 A.M. to one hour before sunset, six days a week.
- B. Day load, short days, $\frac{1}{2}$ hour before sunrise to one hour before sunset, six days a week.
- C. Evening load, ordinary, one hour before sunset to 11 P.M., four days a week.
- D. Evening load, maximum, $\left\{ \begin{array}{l} \text{one hour before sunset to } \frac{1}{2} \text{ hour after sunset.} \\ \frac{1}{2} \text{ hour after sunset to 11 P.M., three days a week.} \end{array} \right.$
- E. Night load, long days, $\left\{ \begin{array}{l} \text{11 P.M. to } \frac{1}{2} \text{ hour before sunrise.} \\ \frac{1}{2} \text{ hour before sunrise to 6.30 A.M., seven days a week.} \end{array} \right.$
- F. Night load, short days, 11 P.M. to $\frac{1}{2}$ hour before sunrise, seven days a week.

Q. Mr. Main, in order to get at the results shown in the plotting of the horse power in June, whether or not you took all the readings that you found on the water power charts for that month? A. I did.

Q. And then noted the hour at which those readings were taken? A. I did.

Q. Then you took the period of time between midnight and one-half hour—or about quarter to 4 in the morning—and put into that period all the readings that were taken during that

time? A. Beginning at 11 o'clock; from 11 o'clock to one-half hour before sunrise.

Q. And you got the average of those? A. I did.

Q. And that straight line represents the average of those readings? A. It does.

Q. Then you took the period of time between quarter to 4 and half-past 6 and put by themselves the readings that were taken during that time? A. I did.

Q. And the same way between half-past 6 in the morning and 6.30 at night? A. Yes, sir.

Q. Whether or not during those various periods the power used is uniform? A. It is fairly uniform.

Q. In the same way you took the readings in the month of July, and separated them into the periods of load, and August and the other months? A. I did.

Mr. GREEN. Is that clear?

The CHAIRMAN. Oh, yes, we understand that.

Q. Now, having in that way got at the power, the average power each month, what did you next do? What use did you make of that? A. In the method in which I have described I obtained the average horse power for each month in the year; and from the records showing the mill powers which I found at the office in the same way I determined the average mill powers which were used in each month in the year, and from that I could obtain the average horse power per mill power.

Q. That is, for the running time? A. For the running time; and to reduce that to 24 hours a day and 7 days in the week was a very simple method, simply multiplying the average for the running time by the number of hours run and dividing it by the total number of hours in the week.

Q. Have you prepared a schedule showing the results of your work for the year beginning June, 1897, and ending in the month of May, 1898? A. I have.

Mr. GREEN. That is Schedule 10.

(Schedule 10 above referred to introduced and marked "Exhibit 166, W. L. H.")

[EXHIBIT 166.]

SCHEDULE 10.

TABLE II. AVERAGE H.P. ON WHEEL SHAFT.

MONTH.	FOR RUNNING TIME.			24 HOURS A DAY, 7 DAYS A WEEK.		
	Av. H.P.	Av. M.P.	H.P. per M.P.	Av. H.P.	Av. M.P.	Av. H.P. per M.P.
1897.						
June	151	2.90	52.1	141		
July	156	3.01	51.9	145		
August	169	3.18	53.0	157		
September . . .	186	3.38	55.1	175		
October	198	3.57	55.6	183		
November . . .	206	3.76	55.1	196		
December . . .	214	3.82	56.0	203		
1898.						
January	215	3.74	56.6	204		
February	196	3.51	55.7	184		
March	182	3.34	54.6	171		
April	170	3.15	54.0	159		
May	154	2.95	52.0	144		
Average	183	3.36	54.5	172	3.16	54.5

Average running time per week, 157.69 hours.

Total hours, 168.

Percentage of whole time which station was run, 94.

Adding all the mill powers together on Holyoke Water Power Company's sheets and dividing by number of observations = 3.25 M.P.

Q. Using Schedule 10, will you tell us now, going to the month of June, 1897, whether you get the 151, the average horse power, as you have described? A. I obtained it in the manner as I have described.

Q. What horse power does that represent; that is, whether on the wheel shaft or where? A. It is the average horse power on the wheel shaft, the vertical shaft of the wheel.

Q. Now you have put in the next column the average mill power, being 2.91 mill power for June. Where did you get that? A. I took the records of the Holyoke Water Power Company of the mill powers used at the electric light station,

and obtained the average mill power for the month in the same way as I obtained the average horse power for the month, by multiplying the mill powers by the periods of time over which they were used and by dividing by the total period of time.

Q. I don't know as I made myself clear: I imagine I did not. Is the 2.91 average mill power shown in June an average of figures which actually appear on charts of the Holyoke Water Power Company? A. It is an average of the actual mill powers shown on those records of the Holyoke Water Power Company.

Q. Now why, if you multiplied that by 65 horse power, that being the statement made here at some time, wouldn't you get the horse power without doing any further work? A. I wouldn't get the horse power which was developed by those wheels.

Q. Why not? A. Because the wheels were run at part gate opening, and, as they were run, did not give an efficiency high enough to produce 65 horse power for a mill power. They actually did produce for the month of June about 52.1 horse power per mill power.

Q. Does this chart which was prepared by the Water Power Company, and a copy of which is here in evidence, show the mill power or horse power actually developed on the shaft by the gate opening? A. The curve?

Q. Yes. A. It does.

Q. Then put it the other way round, so that it may be clear. The 2.91 mill power which is shown on the charts of the Water Power Company represents, then, the water which goes through, the cubic feet of water that goes through the wheel—is that right?—or through the opening? A. It is obtained directly from the cubic feet of water which passes through the wheel and the head under which that water acts.

Q. And whether or not that tells you how many horse power are developed on the shaft? A. That does not.

Q. No. Then having the mill power, which represents the cubic feet of water going through, and the horse power developed on the shaft for all these various months, what use do you make of them? A. I obtained the average horse power

for the year on the wheel shaft, and also the average mill powers used for the year.

Q. And, as I understand— A. For the running time, and also for the total number of hours in the year.

Q. And all these results set out in Schedule 10—I need not read them—are the result of your computations? A. They are.

The CHAIRMAN. I don't know what the fourth column means there.

The WITNESS. I also took the mill powers and added them all together and divided by the number of observations, and the result of that was 3.25 mill powers; and your Honor will remember that you asked me what difference it made if the average was obtained that way or obtained by taking into account the periods of time. There isn't a very great difference, because there is a large number of readings. The average which I obtained by taking into account the periods of different loads was 3.36 mill powers: the average obtained by adding all the mill powers together on the Holyoke Water Power Company's sheets and dividing by the number of observations was 3.25.

Q. You state, I think, below here, two figures which you make use of,—the average running time per week at 157.69, and the total hours of the week at 168? A. Yes, sir.

Q. Give us the result now of your averages, for running time first. A. In the first column is shown the months. The second column shows the average horse power for the running time for the year ending June 1, 1898. The third column shows the average mill power for the year, for the running time. The fourth column shows the average horse power per mill power.

Q. What do you say was the average horse power for the running time? A. 183.

Q. And the average mill power you have given as 3.36, and the average horse power per mill power is what? A. 54.5.

Q. That is for the year beginning with June, 1897, and ending with May, 1898, as I understand, is it not? A. Ending the last of May, 1898.

Q. Now you have gone a step further and given the average, not for the running time, but considering the total hours in the week. What are those averages, and how do you get them?

A. The fifth column shows the average horse power for twenty-four hours a day, seven days a week. That can be obtained by multiplying 183 horse power by 157.69 hours run, and dividing by the total number of hours in the week, 168. The result is 172. The sixth column shows the average mill power for twenty-four hours a day, and seven days a week, and can be obtained from 3.36 mill powers in the same manner. The last column shows the average horse power per mill power, which would be the same as for the running time.

Q. And what was the percentage of the whole time which the station was run during this period? A. 94 per cent.

Mr. GREEN. Now is there anything further that you desire to tell us in regard to your method of work, in obtaining the records of gate openings, the head and mill powers? I think of nothing myself.

The CHAIRMAN. I think we understand his explanation, Mr. Green.

The WITNESS. I think that it has been fully explained.

Q. Have you made any comparison with the results which you have obtained with the test of Messrs. Whitham and Green, which were made January 9 and 10, 1899? A. I made a comparison of that sort.

Q. How did your results compare with these tests? A. The 24-hour test made by Messrs. Whitham and Green, on January 9 and 10, 1899, showed an average indicated horse power of 231 and a maximum indicated horse power of 465. This test took place on Monday night, which is one of the heavy nights in the week. From the figures which I have obtained for January, 1898, the wheel records show 214 horse power on the wheel shaft for the average for the week, and a maximum of 536 horse power for the week. Taking the nights of maximum load, the records showed an average of 227 horse power on the wheel shaft, which coincides closely with the 231 horse power which was obtained on the engine during the test.

Mr. GREEN. Theirs was a test of the engine and yours of the wheel.

By Mr. MATTHEWS.

Q. What was the figure you gave for their maximum? A. 465.

By the CHAIRMAN.

Q. Mr. Main, won't you please restate that? A. The average indicated horse power shown on the engines at the time of the test was 231.

Q. Now what is the maximum? A. And the maximum was 465.

Q. Now what was yours? A. For the whole month of January the average on the wheels is 214, and the maximum was 536. Taking the nights of maximum load in the month, the figures which I have made show the average on the wheel shaft to be 227, which corresponds closely with the 231 obtained during the test.

By Mr. GREEN.

Q. That is, then, their period, as I understand, was a night of very heavy load? A. It was on a Monday night, on which there is a heavy load on the station.

By Mr. GOULDING.

Q. What other nights do you include in your nights of heavy load? A. Monday, Thursday, and Saturday, I think it is.

By the CHAIRMAN.

Q. I see in December, 1897, looking back to Schedule 8, that your maximum load there was nearly 600,—if you will turn back. I think that is so, isn't it? A. December.

Q. December, 1897. A. Nearly 500.

Q. No; but, if you will look at it, there is a dot there. It may be a mistake; but you look at December, 1897, and there is a dot above the 500 mark. A. I think that is on the paper. There isn't any on mine. It doesn't show on this one.

Mr. MATTHEWS. It isn't on my copy. What does the witness say about it?

The WITNESS. I can tell by looking on the records.

The CHAIRMAN. All right.

Mr. MATTHEWS. Perhaps you better do that now.

The WITNESS. The highest maximum horse power of the records for December is 489.

By the CHAIRMAN.

Q. December, 1897? A. Yes, sir.

Q. Then that is a mistake. A. It may have been something on the paper.

Q. That you want to change, I suppose? A. Yes, sir. I will eliminate that mark.

By Mr. GREEN.

Q. Have you made any comparison, Mr. Main, of the horse power on the wheel shaft and the indicated horse power on the engine? A. I have. The horse power on the wheel shaft would be somewhat less than that in the engine cylinder on account of the less loss by friction when using the wheels; and this difference, if the same machinery is used which is now installed, would be slightly less than 10 per cent.

By the CHAIRMAN.

Q. In favor of steam? A. In favor of the wheels.

Q. I don't understand that, Mr. Main. A. This would make the indicated horse power on the engines which is equivalent to the horse power on the wheel shaft 200 for the running time, and 190 for 24 hours a day and every day in the year.

By Mr. GREEN.

Q. The running time being 157 and a fraction hours per week? A. Yes.

By the CHAIRMAN.

Q. That is, you think it would take 17 more horse power to run by steam — or the difference between 183 and 200? A. Yes, sir.

Q. I should like to know why that is so, for I thought it ran the other way. A. Because there is a greater loss in friction in running the engine than there is in running the wheels. There is about, say, 8 per cent. loss in running the engine, and not over 5 per cent. in running the gears of the wheels, and there is also about 2 per cent. loss in the main drive from the engine to the line shaft, so that the net horse power delivered

from the engines—if the net horse power was the same delivered from the engine and the wheels, more horse power would have to be produced in the cylinders of the engine than on the vertical shaft of the wheel.

By Mr. GREEN.

Q. That comparison is between these wheels and these engines, is it not, that are there? A. Yes.

Q. Is there any method of reducing the loss on the engines? A. If a smaller engine were installed for the day load, the friction loss on the engines would be less, and the probable difference wouldn't be over 5 per cent.

Q. Why would a smaller engine reduce the friction loss? A. There are two engines of 400 horse power installed, and the day load is a very small fraction of the rated horse power of the engine; and therefore the friction load is a very large percentage during the day of the net power delivered from the engine, whereas, if that engine were a small one, the percentage of friction would be reduced very largely.

Q. That would make what difference in results? I don't know but you have stated. A. The difference in favor of the wheels would be about 5 per cent.

Q. 5 per cent. instead of 10? A. That would make an equivalent horse power, an indicated horse power on the engine, of 192 for the running time, and 181 for 24 hours a day and 365 days in a year.

Q. You stated some time ago certain facts in regard to the number of horse power per mill power. In fact, it is usually stated, I think, at 65. I want to be sure if that is fully understood. Will you explain again how this works?

The CHAIRMAN. We understand that, Mr. Green. You need not do it for our benefit. Of course, we understand that. It reduces to just the same as your tables have it; it shows on the tables.

Mr. GREEN. Very well.

The CHAIRMAN. You can go ahead if you want to.

Mr. GREEN. The point I want to bring out, and which I want to be sure is understood, if your Honor will excuse me, is whether or not it is fully understood that the figure, the

horse power per mill power to be used in connection with this case, is not 65 horse power per mill power, but 54.5.

Mr. GOULDING. We do not want to agree to any conclusions of yours.

Mr. GREEN. I mean, that is our testimony and our evidence as given by this witness.

The CHAIRMAN. That is the testimony of the witness, not any conclusion we draw.

Mr. GOULDING. I suppose it comes from the reason that a wheel under half gate is not so efficient.

The WITNESS. There is something in the office on cross-section paper that shows the number of days of restriction in each year. It is all plotted day by day. That was shown to me the first day I was there.

By Mr. BROOKS.

Q. Whereabouts was it? A. Upstairs in Mr. Sickman's office, I think.

(Counsel for the City asked counsel for the petitioner to produce such diagram, if it could be found.)

Mr. GREEN. I should like to offer in evidence the original diagrams prepared by Mr. Main, showing the average loads for the months of June, July, August, September, October, November, and December, 1897; and January, February, March, April, and May, 1898. They are the same ones of which reduced blue prints were offered.

(Diagram 2 was marked "Exhibit 167, F. H. B."; Diagram 3, "Exhibit 168, F. H. B."; Diagram 4, "Exhibit 169, F. H. B."; and Diagram 5, "Exhibit 170, F. H. B.")

Q. I did not ask you the formal question, Mr. Main;—these Exhibits 167, 168, 169, and 170 are prepared by you, and are the originals from which the reduced blue prints were prepared? A. They are.

Q. Concerning which you have already testified? A. They are.

Q. In considering the water power that is offered to the City of Holyoke under the proposed contract or lease, will you state what rights, you understand, take precedence over the water offered to the City, or, put it the other way, where the water offered the City comes relative to the contracts or sales already made by the Water Power Company.

Mr. BROOKS. We object to it.

The CHAIRMAN. I do not think you can put it that way.

Mr. GREEN. What he assumes, I say.

The CHAIRMAN. Let him assume as an expert. You did not ask him to assume anything.

Mr. GREEN. I meant to have said "assume" instead of "understand."

The CHAIRMAN. All right.

Mr. GOULDING. We object.

The CHAIRMAN. We admit it, Mr. Goulding.

Mr. GOULDING. Note our exception.

A. I assume that there are rights to use the water power granted prior to the proposed lease to the City of Holyoke; first, rights already acquired on the upper canal and South Hadley canal.

Mr. GOULDING. That is a mere construction of the instrument, and I do not think it is within the competency of any mere expert to assume any propositions of law whatever.

The CHAIRMAN. How is he going to testify with reference to the value of a water power unless he does?

Mr. GOULDING. Well, the world will continue to revolve around its orbit and we shall do business at the same old stand if he does not testify at all. But he certainly cannot, in order to testify, testify to incompetent things; and he cannot, I submit, give a lecture on law or on the construction of instruments, and call it an assumption or a basis of his testimony. It is simply not competent.

Mr. CHAIRMAN. Well, Mr. Goulding, if he testifies on wrong assumptions, his evidence is of no use.

Mr. GOULDING. It may be of no use, but it is incompetent. It is incompetent for an expert, I submit, to come here and state his assumptions as to the construction of a written instrument or instruments; and that is this case.

The CHAIRMAN. What is your purpose in asking these assumptions, Mr. Green? What do you desire to use them for?

Mr. GREEN. Because, in any valuation which a witness gives of water power under this lease,—and that is what we are valuing,—the witness is obliged to understand something about the lease; and we want to show what his understanding is.

The CHAIRMAN. I do not think you can go to that extent.

Mr. GREEN. That is, so far as what his assumption is.

The CHAIRMAN. The more accurate way will be for you to assume yourself, and let him answer on the assumption which you advance. You have your own hypothesis. The effect of it would be that he would have to make the hypothetical question, whereas you ought to. If I were to call an expert where the question is in doubt with reference to the construction of an instrument or anything of that kind, must not I make the hypothesis, and not the witness? You can make it yourself, Mr. Green.

Mr. GOULDING. We should want to be heard on that question, whether you can assume to an expert witness a proposition of law.

The CHAIRMAN. Very well.

Mr. GOULDING. Suppose an expert is called to testify to the effect on the remaining land of the taking of a piece of land: now can you go on and assume that that remaining piece of land has got certain incorporeal hereditaments attached to it, rights of way, and this and that sort of thing? "I assume this and that thing as matters of law, Mr. Expert. You don't know anything about law, but I assume the following things as matters of law. Now I ask you what your opinion is of the effect on the value of that property of the taking, in view of my

assumptions." I object. I submit with great respect that you cannot do it. What you can assume is facts, if you want to, in your hypothesis,—any facts,—and then you can ask the witness his opinion.

The CHAIRMAN. Let Mr. Green put his question, and we will rule on it when put.

Mr. GREEN. Without waiving our right to put the question again, I will omit it at this moment, if your Honor please. I will come back to it in a little while.

Q. Whether or not you have accepted any figures or any statements as to the days of restriction for non-permanent power in this upper level canal? A. I have accepted the testimony which was put in by Mr. A. F. Sickman.

Q. For what years? A. 1894, 1895, 1896, 1897, and 1898.

Q. What mills does that embrace? A. I have the days of restriction on three mills: on the George R. Dickinson for the last three years only, on the Parsons Paper Company No. 2, and the Linden Paper Company for the entire period.

Q. To aid us, can you tell where in the testimony of Mr. Sickman that is found? A. The date is January 29, 1900.

Q. I will show this to you, and see if this is what you refer to. This is Vol. VI., page 438. Is that the — A. That is the testimony that I refer to.

Q. And the average days of restriction from the Parsons Paper Company No. 2 during that period are how much? A. 22.2.

Q. And for the Linden? A. 24.13.

Q. Have you from the evidence obtained anywhere the days of restriction for the Parsons and the Linden for 1899? A. From the same evidence I have the days for 1899.

Q. Can you tell us what page that appears on? Is that on the same page? A. That is on the same page.

Q. Including 1899 in the period of your average, what is the average days of restrictions, Parsons and Linden?

Mr. BROOKS. What do you mean by that,—for the three years?

Mr. GREEN. Taking from 1894 through 1899.

Mr. BROOKS. Six years.

A. 29.85. The average for the Parsons and Linden for the years 1894 to 1898 inclusive is 23.16.

Q. Have you put these days of restriction in a schedule form? A. I have.

Q. For convenience in use? Will you let me see it? (Papers produced.)

Mr. GREEN. This is Schedule 12.

(Marked "Exhibit 171, F. H. B.")

[EXHIBIT 171.]

SCHEDULE 12.

DAYS OF RESTRICTION.

YEAR.	DAYS OF RESTRICTION OF 24 HOURS.		
	Geo. R. Dickinson.	Parsons Paper Co. No. 2.	Linden Paper Co.
1894		36.875	44.875
1895		49.1	50.5
1896	2.75	2.75	2.25
1897	15.55	15.42	15.25
1898	7.83	6.85	7.80
Averages		22.20	24.13

Average of Parsons and Linden 23.16

1899, 1st 3 . . . 51.8 49.4 75.00

2d 3 . . . 53.1

Average of Parsons and Linden, including 1899 29.85

Q. Mr. Main, have you ascertained to your satisfaction the comparative cost of water power and steam power in the running of this electric light station on various assumptions, beginning with the assumption of \$72,000 bonus and \$1,500 a year rental? A. I have.

Q. On the supposition that the \$72,000 is paid for a bonus for the land and privilege and \$1,500 a year rental for 16 mill powers, what do you say that it costs to run the plant, using

water? A. The cost of water power for the year would be \$31,059. The cost of supplementary steam power for the same time would be \$4,709. And the sum of these two, making the total yearly cost of power, would be \$35,768. The cost of steam power alone, using the present steam plant, for the year would be \$19,691.50.

Mr. BROOKS. Is that producing, Mr. Green, 16 mill powers?

Mr. GREEN. That is running this plant, producing, as I understand, Mr. Main, how much power?

A. The average load on the station, 200 horse power.

Q. In getting at the cost of the steam power, as I understand, you used the plant that is here? A. I have.

Q. At the present time the engines and the boilers, without change. A. Yes.

Q. How much, on this basis, more does it cost to run the plant by water than by steam alone? A. \$16,076.66.

Q. Whether or not by changes in the steam plant the difference in favor of steam could be changed, and, if so, in what way and to what extent? A. If the engines were simple condensing, the coal consumption would be reduced to about three pounds per horse power hour, or reduced by about one-eighth the cost of coal shown above for both the supplementary steam power and steam power alone, thus making the cost of water power and supplementary steam power \$35,668.43, and the cost of steam power alone \$18,405.94; difference in favor of steam power, \$17,262.49. The difference would be greater in favor of steam power than with the present uncondensing plant. If the engines were compound condensing, the coal consumption would be reduced to about 2 1-2 pounds per horse power hour; that is, still further increasing the difference in favor of steam power alone.

Q. In getting at the cost of running by the water plant, what do you take the value or cost of the water power plant to be? A. \$69,850.

Q. That is in accordance with the schedule already introduced? A. It is.

Q. And the steam plant? A. \$43,060.

Q. What items do you charge up against the water plant in order to get at the cost of running? A. The fixed charges against the water power plant are: interest at 5 per cent.; depreciation and repairs, 1 per cent.; taxes, 1 per cent.; and insurance is very slight; a total of 7 per cent. on \$69,850, which is equal to \$4,889.50. Interest on price asked for land and water power, \$72,000 at 5 per cent., equals \$2,600. Charge for 16 mill powers, \$24,000, less rebate for twenty-three days at \$80, \$1,840, equals \$22,160. Attendance on wheel plant, \$159.51.

Q. Are those your own figures or what you take? A. Those I took from Mr. Allen. Oil, waste, and supplies, \$250. Total cost of water power, including interest on land and water rights, \$31,059.01.

Q. Have you put in the form of a schedule your computations by which you have arrived at the results already stated?

A. I have. (Papers produced.)

Q. This is headed "Schedule 13"? A. Yes, sir.

Mr. GREEN. If there is no objection, I would like to offer Schedule 13 in evidence in connection with this testimony.

(Schedule 13 was marked "Exhibit 172, F. H. B.")

[EXHIBIT 172.]

SCHEDULE 13.

COMPARATIVE COST OF WATER POWER, SUPPLEMENTARY STEAM POWER, AND STEAM POWER ALONE.

Paying \$72,000 Bonus and \$1,500 a Year Rental for 16 Mill Powers.

WATER POWER.

The estimated cost of the water power plant is	\$69,850.00
The estimated cost of the steam power plant is	43,060.00
The fixed charges against the water power plant are interest at 5%, depreciation and repairs 1%, taxes 1%, insurance very slight, = 7% on \$69,850	4,889.50
Interest on price asked for land and water power, \$72,000, @ 5% . .	3,600.00
Charge for 16 M. P., \$24,000 (rebate for 23 days @ \$80 a day = \$1,840)	22,160.00
Attendance on wheel plant (Vol. V., p. 21, Allen, \$159.69)	159.51
Oil, waste, and supplies	250.00
Total cost of water power, including interest on land and water rights	<u>\$31,059.01</u>

SUPPLEMENTARY STEAM POWER.

The fixed charges against the steam plant are interest at 5%, depreciation and repairs 2%, taxes 1%, total 8%.

8% of \$43,060	\$3,444.80
Fire and boiler insurance	132.50
Coal for 28 days a year, including Sundays and holidays when there is no water in canal. On about 4 of these days, Sundays, there will be no day load during the day if the plant runs as at present. The remaining days, week-days, will have the average 24-hour load. 24 x 24 = 576 hours x 200 = 115,200 H. P. hours. 4 x 13.65 = 54.6 hours x 267 = 14,578 H. P. hours. 129,778 H. P. hours. Pounds of coal per H. P. per hour, 3.40. Cost of coal per ton, \$4.05. $\frac{129,778 \times 3.40}{2,240} = 197 \text{ tons @ } \4.05	797.85
Attendance: 2 engineers, \$3 each for 28 days = \$168 2 firemen, \$2 each for 28 days = 112	280.00
Oil, waste, and supplies	50.00
Carting ashes	4.00
Cost of supplementary steam power	\$4,709.15
Yearly cost of water power	<u>31,059.01</u>
Total yearly cost of power	<u>\$35,768.16</u>

$\$35,768.16 \div 200 = \178.84 per I. H. P. per year for H. P. developed during the running time.

$\$35,768.16 \div 190 = \188.25 per I. H. P. per year for equivalent H. P. spread over 365 days of 24 hours.

COST OF STEAM POWER ALONE, USING PRESENT STEAM PLANT.

Fixed charges on steam plant, interest 5%, depreciation and repairs	
4%, taxes 1%, total 10%, on \$43,060	\$4,306.00
Boiler and fire insurance	132.50
Coal at 3.40 lbs. per H. P. per hour at \$4.05 per ton for 1,640,288 H. P. hours.	
$1,640,288 \times 3.40$	
2,240 = 2,490 tons @ \$4.05	10,084.50
Attendance: 2 engineers @ \$3 a day, 365 days	2,190.00
2 firemen @ \$2 a day, 365 days	1,460.00
Oil, waste, and supplies	600.00
Carting ashes, 174 tons @ 25c.	43.50
Interest on land, \$17,500 @ 5%	875.00
Total cost of steam power alone	<u>\$19,691.50</u>

$\$19,691.50 \div 200 = \98.46 per I. H. P. per year.

Total yearly cost of water power and supplementary steam power	\$35,768.16
Total yearly cost of steam power alone	<u>19,691.50</u>
Difference in favor of steam power alone	<u>\$16,076.66</u>

$\$16,076.66 \div 200 = \80.38 per I. H. P. per year in favor of steam power.

If the engine were simple condensing, the coal consumption would be reduced to about 3 lbs per H. P. hour, or reduced by about $\frac{1}{4}$ of cost for coal shown above for both the supplementary steam power and steam power alone, thus making

Cost of water power and supplementary steam power, \$35,768.16 —	
\$99.73	\$35,668.43
Cost of steam power alone, \$19,691.50 — \$1,285.56	<u>18,405.94</u>
Difference in favor of steam power	<u>\$17,262.49</u>

Difference is greater than with present non-condensing plant.

If the engines were compound condensing, the coal consumption would be reduced to about $2\frac{1}{2}$ lbs. per H. P. hour, thus still further increasing the difference in favor of steam power alone.

Q. You charge up as against the cost by water power a supplemental steam power? A. I do.

Q. I assume your reasons for that are obvious, but they have not been stated. I will ask you to state them. A. As there are many days when there will be no water power at the station, and as the electric lighting and power must be furnished every day, it is obviously necessary to have a supplemental steam plant to run during those days when there is no water.

Q. In your cost of the supplementary steam power, I think, the fixed charge item explains itself. A. Fixed charges at 8 per cent. on \$43,060 equals \$3,444.08.

The CHAIRMAN. That explains itself, doesn't it? I should like to know about that twenty-eight days.

Q. Will you explain that, — coal for 28 days a year? A. I assumed that there would be 23 days of restriction, and, in addition to that, five days of annual shut-down, making 28 days in all when there would be no water that could be furnished to the station.

Q. Why do you assume that there will be no more than five days when there will be no water? A. That has been given in evidence — it is about five days a year, as I understand it, — that the annual shut-down consumes on an average about five days every year. Sometimes it is more, and sometimes it is less.

Q. Do you understand that on Sundays and holidays water can be used in this plant for water power? A. I understand under the new offer that, whenever there is water in the canal on Sundays, it can be used.

Q. Then, as I understand, you have based these figures on your understanding of the new offer, not the old offer? A. Yes, sir.

Q. And, in your understanding of the new offer, you understand that there would be water on Sundays and holidays?

The CHAIRMAN. Well, that is all right, whether he understands it or not. He has gone on that assumption.

Q. You have assumed that? A. Well, I have assumed this: that there will be 28 days in the year, including Sundays and holidays, when there would be no water in the canal which the electric light plant would be allowed to draw.

Q. Where did you get your figure of coal per ton, \$4.05?

A. That is the figure which has been used by some of the witnesses on the other side as the price paid by the Holyoke Water Power Company for coal.

Q. And the figures for attendance, for fireman and engineers, — whether they are your own or taken from anybody's else figures? A. They are my own figures.

Q. May I ask, throughout these schedules where you have used anyone's else figures, if you have indicated it in some way?

A. I have in every case.

By Mr. BROOKS.

Q. Where is it indicated for the coal? A. Except that.

Mr. GREEN. Has Schedule 13 been marked? Yes, I find it has.

The CHAIRMAN. I do not know as it would help you to suggest; but that schedule, I think, we understand.

Mr. GREEN. I did not expect to ask any further questions in regard to the schedule.

By Mr. GREEN.

Q. By the way, I don't know that you have stated anything in regard to the sizes of these plants. I presume it is already in evidence. Whether or not each of these plants is large enough to produce the equivalent of 16 mill powers? A. It is.

Mr. BROOKS. May I ask a question, Mr. Green?

Mr. GREEN. Certainly.

Mr. BROOKS. Do I understand you to claim that in his charges for supplemental steam power he goes upon the basis of its producing 16 mill powers?

Mr. GREEN. No, I don't understand so at all.

The WITNESS. It is 200 horse power.

Mr. GREEN. He simply said it was found capable of producing that.

Q. The item of cost of power you have enumerated in the schedule itself? A. I have.

Q. Whether or not you have estimated the cost of the water power in the running of this plant if \$72,000 is paid for

bonus for 16 mill powers, and rental for 8 mill powers only is charged at \$1,500 a year? A. I have.

Q. And what would power cost on those terms? A. The yearly cost of water power, including interest on land, \$19,979.01.

Q. What would it cost to run by steam alone? A. Supplementary steam power?

Q. It would be the same figures as on the schedule? A. It would be the same as Schedule 13.

Q. The difference would be what? A. The supplementary steam power would be the same as in Schedule 13, \$4,709.15. The cost of water power and supplementary steam power would be the sum of these two,—\$24,688.16. The cost of steam power alone, the same as in Schedule 13, \$19,691.50; the difference in favor of steam power alone, \$4,996.66.

Q. Have you computed the cost of water power and supplementary steam power per indicated horse power per year? A. I have.

Q. What would that be on the basis of \$24,688? A. \$124.44.

Q. \$124 or \$123? A. \$123.44.

Q. For water? A. Water power and supplementary steam power.

Q. And for steam power alone? A. \$98.46.

Q. And the difference in favor of steam power alone per indicated horse power? A. \$24.98.

Q. That, as I understand it, is on the assumption of coal at what price? A. \$4.05 a ton.

Q. And running the engines as they are? A. Running the same engines as are now in the plant.

Q. I presume the remarks made relative to the difference in favor of steam that could be obtained by the use of condensing engines hold true here? A. The same remarks hold true.

Q. Have you put your computations in the form of a schedule, so far as they relate to this? A. I have.

Mr. GREEN. I offer Schedule 14.

(Marked Exhibit 173.)

[EXHIBIT 173.]

SCHEDULE 14.

COMPARATIVE COST OF WATER POWER AND SUPPLEMENTARY
STEAM POWER AND STEAM POWER ALONE.

*Paying \$72,000 Bonus for 16 Mill Power and Rental for 8 Mill Power only at
\$1,500 a Year a Mill Power.*

COST OF POWER PAYING \$4,500 FOR 16 MILL. POWER AND RENTAL FOR 8
MILL POWER ONLY AT \$1,500.

8 M. P. @ \$1,500 = \$12,000 (rebates for 23 days @ \$40 a day = \$920) = \$11,080	\$11,080.00
Fixed charges on water power plant	4,889.50
Interest on \$72,000 @ 5%	3,600.00
Attendance, wheel plant	159.51
Oil, waste, and supplies	250.00
Yearly cost of water power, including interest on land . . .	<u>\$19,979.01</u>

SUPPLEMENTARY STEAM POWER.

Same as in Schedule 13	<u>4,709.15</u>
Cost of water power and supplementary steam power	\$24,688.16
Cost of steam power alone, same as Schedule 13	<u>19,691.50</u>
Difference in favor of steam power alone	<u>\$4,996.66</u>
Cost of water power and supplementary steam power per I. H. P. per year, \$24,688.16 ÷ 200	\$123.44
Cost of steam power alone per I. H. P. per year, same as Schedule 13, \$19,691.50 ÷ 200	<u>98.46</u>
Difference in favor of steam power alone per I. H. P. per year, \$4,996.66 ÷ 200	<u>\$24.98</u>

The difference in favor of steam power alone would be increased by using
simple condensing engines or compound condensing engines.

Q. Have you computed for us how much the water power
would cost in the running of this plant if a bonus of \$36,000
was paid and a rental charged for 8 mill powers at the rate of
\$1,500 a mill power? A. I have.

Q. What would be the cost of the water power and supple-
mental steam power on that assumption? A. \$22,888.16,

Q. The cost of steam power alone, I suppose, is the same
as is shown in Schedule 13? A. Yes; \$19,691.50.

Q. Leaving a difference in favor of steam power of how much? A. \$3,196.66.

Q. What would be the cost of water power and supplementary steam power per indicated horse power on that basis? A. \$114.44.

Q. And per indicated horse power of steam alone, how much? A. \$98.46.

Q. A difference in favor of steam power alone of how much? A. \$15.98.

Q. On the assumption, that is, of \$4.05 a ton for coal? A. I have called it that price in all of these schedules up to the present.

Q. And the engines just as they are? A. Yes, sir.

Q. Simple non-condensing engines. Have you prepared a schedule setting out your computations by which you arrived at these results? A. I have.

Mr. GREEN. I offer this Schedule 15.

(Marked Exhibit 174.)

[EXHIBIT 174.]

SCHEDULE 15.

COMPARATIVE COST OF WATER POWER AND SUPPLEMENTARY STEAM POWER AND STEAM POWER ALONE.

Paying a Bonus of \$36,000 for 8 Mill Power and Rental for 8 Mill Power at \$1,500 a Mill Power.

WATER POWER.

Fixed charges	\$4,889.50
Interest, land, and privilege, \$36,000 @ 5%	1,800.00
8 M. P. @ \$1,500 = \$12,000 (rebate for 23 days @ \$40 a day, \$920)	11,080.00
Attendance	159.51
Oil, waste, and supplies	250.00
Cost of water power	<u>\$18,179.01</u>

SUPPLEMENTARY STEAM POWER.

Same as Schedule 13	4,709.15
Total yearly cost of power	\$22,888.16
Cost of steam power alone, same as Schedule 13	19,691.50
Difference in favor of steam power	<u>\$3,196.66</u>

$\$22,888.16 \div 200 = \114.44 cost of water power per H. P.

$19,691.50 \div 200 = 98.46$ cost of steam power per H. P.

Difference, $\$15.98$ in favor of steam power.

The difference in favor of steam power alone would be increased by using simple or compound condensing engines.

Q. I don't know that there is anything in particular that needs explanation in this, Mr. Main, the difference in the figures which are made and in the rental? A. Each schedule fully shows whatever is different from the preceding ones.

Mr. GREEN. We had some discussion as to how far the figures set out in the schedules are evidence. I don't care to have it read, but will let them speak for themselves unless there is some objection.

The CHAIRMAN. We assume that the schedule is part of the evidence, unless there is some objection.

Q. Now, Mr. Main, have you computed the cost of water power at this plant, in running this plant, as it was run at the time used as a basis, if a bonus of \$72,000 is paid for 16 mill power, and a rental charged for water as used at the rate of \$1,500 per mill power? A. I have.

Q. The cost of supplemental steam power would be the same, as I understand it, \$4,709.15. What would the water power alone cost on that basis? A. \$13,552.61.

The CHAIRMAN. What is that for, Mr. Green?

Mr. GREEN. Paying a bonus of \$72,000, and paying for water as used, measured, at the rate of \$1,500 per mill power.

Q. In getting at the result of \$13,552.61 as the cost of water alone, apart from supplemental steam, how much average power do you estimate was used? A. 3.36 mill powers.

Q. You have run the plant on that basis all but 20 days? A. 23 days.

Q. You have allowed a rebate of 23 days? A. Yes. All but 28 days.

A. And you have allowed a rebate of 23 days? A. Yes, sir.

Q. Using the figures of 23 as already testified to? A. Yes.

Q. And, as I understand you, on steam power alone the figures would be the same as before? A. Yes.

Q. That leaves a difference on this computation in favor of water power? A. It does.

Q. Of how much? A. \$1,429.74.

Q. That is, running the engines as they are, and coal at \$4.05 a ton? A. It is.

Q. Reducing the cost of water power and supplemental steam power to its cost per indicated horse power per year, it would be how much? A. \$91.31.

Q. And steam alone per indicated horse power, as here computed, would be how much? A. \$98.46.

Q. The difference in favor of water power on these assumptions would be how much? A. \$7.15.

Q. Supposing that the engines, instead of being simple non-condensing engines, as now, were made simple condensing engines, what difference, if any, would be produced in your results? A. The cost of water power and supplementary steam power would be reduced to \$18,162.03. The cost of steam power alone would be reduced to \$18,405.94. And the difference in favor of water power would be reduced to \$243.91.

Q. Briefly, the difference comes where? A. In the cost of coal.

Q. Supposing that the engines were compound condensing engines, what difference would that make, if any? A. The cost of water power and supplementary steam power would be reduced to \$18,050.56. The cost of steam power alone would be reduced to \$17,022.04.

By Mr. BROOKS.

Q. That is upon the theory that condensing water is free? A. Yes, sir. The difference in favor of steam power alone would be \$1,028.52.

By Mr. GREEN.

Q. Now, with that difference of \$1,028.52 on the supposition that the engines are compound condensing engines, can you tell us what, in your opinion, the value of the land and privilege is, if water is bought measured at the rate of \$1,500 per annum?

Mr. BROOKS. That, of course, we desire to save the same exception to.

The CHAIRMAN. We have already passed on that.

The WITNESS. The price of \$72,000, which is asked for the land and privilege, and which I have used in all of the previous estimates, must be reduced by this difference of \$1,028.52, capitalized at a proper rate of interest; and the per cent. which I have used is 5. \$1,028.52, capitalized at 5 per cent., is \$20,570.40. \$72,000 minus \$20,570.40 equals \$51,429.60, which is the value of the land and privileges, with the right to draw 16 mill powers, and to pay at the rate of \$1,500 per year per mill power for such quantity as is used.

Q. Then, if I understand you right, if \$51,429 were substituted in your calculation for \$72,000, where you use compound condensing engines, it is a matter of indifference, as far as the result goes, whether one or the other power is used? A. The cost would be the same, whether they used water and supplementary steam power or steam power alone.

Q. Have you made an estimate of the cost of water power and supplemental steam power here, as compared with steam power alone at some other location in Holyoke, with compound condensing engines? Pardon me. You have a schedule for the last computation? A. I have.

Q. Which was prepared by you, and sets out your various computations by which you arrived at the results you testified to? A. It does.

(Schedule 16 offered in evidence. Marked Exhibit 175.)

[EXHIBIT 175.]

SCHEDULE 16.

COMPARATIVE COST OF WATER POWER AND SUPPLEMENTARY
STEAM POWER AND STEAM POWER ALONE.

Paying a Bonus of \$72,000 for 16 Mill Power and Rental charged for Water as used.

COST OF WATER POWER.

Average M. P.'s used for year, 3.36 @ \$1,500	\$5,040.00.	
Rebate for 23 days @ \$5 a M. P.	386.40	\$4,653.60
Interest on \$72,000 @ 5%		3,600.00
Fixed charges		4,889.50
Attendance		159.51
Oil, waste, and supplies		250.00
Cost of water power		\$13,552.61
Cost of supplementary steam power, same as Schedule 13		4,709.15
Total cost of steam and water power		\$18,261.76
Cost of steam power alone		19,691.50
Difference in favor of water power		\$1,429.74
Cost of water power and supplementary steam power per I. H. P. per year, \$18,261.76 ÷ 200		91.31
Cost of steam power alone per I. H. P. per year, \$19,691.50 ÷ 200		98.46
Difference in favor of water power per I. H. P. per year, \$1,429.74 ÷ 200		7.15

If the engines were simple condensing, the cost of water power and supplementary steam power and steam power alone would be reduced as follows:—

Water power and supplementary steam power, \$18,261.76 — \$99.73	\$18,162.03
Steam power alone, \$19,691.50 — \$1,285.56	18,405.94
Difference in favor of water power	\$243.91

If the engines were compound condensing, the cost of power would be reduced as follows:—

Water power and supplementary steam power, \$18,261.76 — \$211.20	\$18,050.56
Steam power alone, \$19,691.50 — \$2,669.46	17,022.04
Difference in favor of steam power alone	\$1,028.52

\$1,028.52 capitalized at 5% = \$20,570.40.

\$72,000.00 — \$20,570.40 = \$51,429.60, value of land and privilege with the right to draw 16 M. P. and to pay at the rate of \$1,500 a year a M. P. for such quantity as is used.

Mr. GREEN. Now, if you will repeat that question?

(Question read.)

The WITNESS. I have.

Mr. GOULDING. This comes in under our objection, as we have stated before.

The CHAIRMAN. Yes.

Mr. GREEN. I will offer the schedule first, and have it looked over. It involves some new figures.

Q. Have you put in the form of a schedule your computations, the results of your work, contained in the schedule marked Schedule 17? A. Schedule 17.

(Schedule 17 put in evidence. Marked Exhibit 176.)

[EXHIBIT 176.]

SCHEDULE 17.

COMPARISON OF COST OF WATER POWER AND SUPPLEMENTARY STEAM POWER AND STEAM POWER ALONE AT SOME OTHER LOCATION, WITH COMPOUND CONDENSING ENGINES.

Estimated cost of compound condensing plant consisting of two 400 H. P. and one 150 H. P. engines, and everything else which makes a steam plant complete, buildings and machinery . . . \$58,950.00

COST OF RUNNING.

Interest on land on bank of Connecticut River, $1\frac{1}{2}$ miles above dam, \$5,000 @ 5%	\$250.00
Interest 5%, depreciation and repairs 4%, taxes 1%, total 10% on \$58,950	5,895.00
Boiler and fire insurance	140.00
Coal, $\frac{1,574,676 \text{ H. P. hrs.} \times 2.5 \text{ lbs.}}{2240 \text{ lbs.}}$	7,119.90
Attendance, 2 engineers @ \$3 a day = \$6. 2 firemen @ 2 a day = 4. \$10 x 365	\$3,650.00
Oil, waste, and supplies	750.00
Carting ashes	28.00
Total yearly cost	\$17,832.90
Yearly cost per H. P. = $\$17,832.90 \div 192$	92.89
Add for extra length pole line	1.56
Total cost per H. P.	\$94.45

Total cost gross sum	\$18,132.90
The cost of water power and supplementary steam power if the bonus is \$72,000, and rental is paid for 3.36 M. P. @ \$1,500 a M. P. a year, is	18,261.76
Difference in favor of steam power	\$128.86
\$128.86 capitalized at 5%	\$2,577.20
\$72,000.00 — \$2,577.20	\$69,422.80
With coal at \$3.75 a ton, the difference in favor of steam power alone would be increased to	\$484.86
With coal at \$3.75 a ton and direct connected units, the difference in favor of steam power would be increased to	\$1,016.00
\$1,016 capitalized at 5% = \$20,320.	
\$69,422.80 — \$20,320 = \$49,102.80, value of the privilege accompanied with the right to draw such water as is needed at \$1,500 a M. P. a year, and paying for the average amount used.	

Mr. BROOKS. I should like to have a memorandum made, if you please, that this comes in under our exception, and any evidence relating to it comes in under our exception; and we shall have no occasion to interrupt.

Q. In getting at the results which you have tabulated in Schedule 15, how many horse power do you produce? A. Schedule 15?

Q. 17. A. 192.

The CHAIRMAN. This is 400 horse power and 150 horse power?

The WITNESS. That is the size of the plant.

Q. You are producing an average of 192 horse power. Will you tell us the nature of the plant you consider here? A. I consider that the plant to be installed would consist of two 400 horse power and one 150 horse power engines, and everything else that goes to make up a steam plant complete, these to be compound condensing engines.

Q. That is \$58,950? A. The estimated cost of which is \$58,950.

Q. Does that include land? A. It does not.

Q. Not including land, what does it include? A. It includes the buildings and machinery which go to make up a complete steam plant.

By Mr. BROOKS.

Q. This does not comprehend electrical equipment? A. It does not.

By Mr. GREEN.

Q. In the cost of running, I notice the first item is interest on land, \$5,000. Where do you get that item of \$5,000? A. I assume that the lot of land which has been shown me, which is suitable for the erection of an electric light station, can be purchased for the sum of \$5,000.

Q. One particular lot of land was shown to you? A. It was.

Q. Where was that lot of land? A. That was located on the bank of the Connecticut River, about a mile and a half, I should think, above the dam. It is a flat lot, which lies between the Boston & Maine railroad and the river.

The CHAIRMAN. What difference does it make about that?

Mr. GREEN. Some figures will come later in regard to coal and land, and I desire to make —

Mr. GOULDING. What difference does it make about that, your Honor?

The CHAIRMAN. It seems to me, while the witness may assume the value of the land, we cannot assume that land was bought, or any other land was bought. We have a right to go on the theory that land can be bought for \$5,000. That is enough.

Mr. GREEN. That is true. I only asked for a description of the lot to identify it for later purposes: that is all.

The CHAIRMAN. All right, sir.

The WITNESS. Somewhere about two miles from the city hall.

Q. It is land between the railroad track and the river? A. Yes, sir.

Q. Whether or not it is land that would answer the purpose, — that would furnish water for condensing purposes? A. It would.

Q. Your coal you compute at $2\frac{1}{2}$ pounds per horse power hour? A. Yes.

Q. And at how much a ton is this computed? A. At \$4.05 per ton.

Q. How much would the steam power in some other plant using a compound condensing engine cost, in your opinion?

A. The total yearly cost would be \$17,832.

Q. That would be how much for indicated horse power?

A. That would be \$92.89 per indicated horse power.

Q. I notice you say, "Add for extra length of pole line \$1.56." What do you mean by that? A. I have been informed that it would cost about \$3,000 for the extra length of pole line from this point at which the station would be located to the centre of the city, and that the maintenance of that would be about \$300 a year, or about \$1.56 per horse power; and this I have added to the cost of producing steam power, making the total cost of producing horse power \$94.45.

Q. That is, it makes the total cost of delivering horse power in the city at substantially the same point where it is now made? A. It is equivalent to manufacturing it at the same point.

Q. But your understanding or assumption in regard to that pole line is that the \$3,000 includes the copper as well as the pole,—that is, the complete line? A. That is my understanding.

Q. And the cost of the water power and supplemental steam power, if the bonus is \$72,000 and rental is paid for 3.36 mill power at \$1,500 per mill power per year, is how much? A. \$18,261.76.

Q. It leaves a difference as shown here in favor of steam power of \$128.86? A. Yes.

Q. On the assumption of \$4.05 coal, that is? A. It is.

Q. What does that result lead you to? A. I have capitalized that difference of \$128.86 at 5 per cent., which gives \$2,577.20, and deducted that from \$72,000, leaving \$69,422.80.

Q. If coal were \$3.75 a ton instead of \$4.05, what difference would that make? A. It would increase the difference in favor of steam power alone to \$484.86.

Q. And if, besides that, direct connected units were used, what difference would that make? A. It would increase the

difference in favor of steam power to \$1,016. This I have capitalized at 5 per cent., which equals \$20,320, and deducted it from \$69,422.80, leaving \$49,102.80 as the value of the privilege accompanied with the right to draw such water as is needed at \$1,500 a mill power per year and paying for the average amount used.

Q. Why do you have — this may have been alluded to before — why do you have three engines? I think you have stated.

The CHAIRMAN. Yes, he did.

A. During the day there is a very light load, and it would be economy to install a smaller engine than 400 horse power to run this day load.

Q. Have you in dividing up the hours of the week divided them in such a way as to show about how many horse power are used during the different periods? A. That is all shown in the diagrams which have been submitted.

Q. Have you taken into consideration the varying load in your estimate of $2\frac{1}{2}$ pounds of coal per horse power hour? A. I have.

Q. What are — we need this, I think, a little later — what are the horse power hours, how many? A. In a week?

Q. Yes, in a week, first. Have you them there? A. I do not know as I understand you. Oh, I think I do, yes. The load varies from about 40 horse power to about 550 horse power, and averages about as follows on the wheel shaft: 43 horse power for 11.66 hours a week, which is equivalent to an indicated horse power of about 45; 89 horse power for 61.76 hours a week, which is equivalent to an indicated horse power of 93; 312 horse power for 29.31 hours a week, which is equivalent to an indicated horse power of 328; 444 horse power for 14.03 hours a week, which is equivalent to an indicated horse power of 466; 174 horse power for 42.98 hours a week, which is equivalent to an indicated horse power of 183.

Q. You have already given the average indicated horse power on the engines. Now will you state what the horse power hours would be? A. The horse power hours would be 1,574,676.

Mr. BROOKS. That is, for a year?

Mr. GOULDING. A week.

Mr. BROOKS. How long is that for, Mr. Main?

The CHAIRMAN. What is that for, anyway?

Mr. BROOKS. I don't know.

Q. Will you state what the horse power hours are? what length of time do they include?

Mr. GREEN. Do you mean, Mr. Brooks, to ask what they were, or what period of time they cover?

Mr. BROOKS. How long?

The CHAIRMAN. What period of time. He said a million —

Mr. BROOKS. That 1,574,676 is for a year, isn't it?

Mr. GREEN. I understand it to be for a year. (To witness.) Look on Schedule 17, first page.

The WITNESS. That is the total for the year.

Q. Now, Mr. Main, as I understand, you have assumed \$4.05 a ton for coal. Why have you assumed that price, \$4.05 per ton? A. That is the price which was used by some of the experts for the Company.

Q. Have you any personal knowledge of the cost of coal in Holyoke during the period described or alluded to? A. I made some inquiries as to the price of coal during that time.

Q. I don't know whether you have anything more than what you were told? A. I saw the books of one concern who were buying and selling coal.

The CHAIRMAN. You have already assumed the price of \$3.75, and of course we shall allow you to assume any price. The witness himself has no personal knowledge of it.

Mr. GREEN. I did not know whether he had or not. I was only asking him.

Q. You only know from hearing some prices or making some inquiries? A. Yes.

Q. You have no personal knowledge beyond that. A reduction to \$3.75 a ton, for instance, would make certain differences in your schedules, some of which you have enumerated, and possibly all, but I think not quite all,—would make how much difference in Schedule 13? A. Schedule 17?

Q. In Schedule 13.

The CHAIRMAN. A reduction of how much?

Mr. BROOKS. 30 cents a ton.

The CHAIRMAN. From \$4.05?

Mr. BROOKS. Yes, to \$3.75.

Q. I think you have this computed in a memorandum which you have there. If you will turn to page 34 of your work.

The CHAIRMAN. You put that in once, Mr. Green.

Mr. GREEN. I was under the impression that I did not. I saw it in one or two of the schedules, and in another it appears to be not on the schedule: it seems to be a separate computation which he has made.

A. It would make an increase in the difference of \$575 in favor of steam in Schedule 13, and \$597 in Schedules 14, 15, and 16, and \$356 in Schedule 17.

Q. And what style of a plant have you considered in your estimates? A. In all of the schedules, except the last part of 17, the estimates have been made for a shaft-driven plant like the present one.

Q. And on the supposition that the generators were direct-driven, what changes would be made? A. There would be considerable saving in space now occupied by shafting and dynamos, in the care and maintenance of shafting and belting, and by the decrease in friction losses in transmission of power.

Q. Omitting the savings that you allude to, except the additional friction losses, what would be the saving? A. It would be a saving of at least 10 per cent. in the power with direct connected units.

Q. And that saving would amount to what, in coal alone? A. About 176 tons, amounting to \$660 at \$3.75 a ton.

Q. And that comes, as I understand, wholly from the saving in friction lost by direct connected units over belt-driven units?

A. Yes, sir.

Q. Taking the saving in the price of coal, the difference between \$4.05 and \$3.75, and the friction loss, amounting to \$660, the total is what? A. The total saving is \$1,016 a year.

Q. And what does that amount to in the value of the plant?

A. That, capitalized at 5 per cent., is \$20,320, which deducted from \$69,422.80 leaves a balance of \$49,102.08 as the amount which could be paid for the privilege accompanied by the right to draw such water as is needed at \$1,500 a mill power a year, paying for the average amount used.

Q. In considering the twenty-three restricted days,— that is, considering the number of restricted days to be twenty-three,— have you obtained any information from the Water Power Company, either at their office or in the course of the testimony, in what way the holders of non-permanent power are treated?

Mr. BROOKS. He can answer that yes or no. Of course we won't object to that.

The CHAIRMAN. He asks you yes or no, whether you have or not.

A. I don't know as I can answer that yes or no.

Q. Perhaps having two things in it is confusing. I will strike that question out, and I will divide that into two parts. Whether or not you obtained any information from the officials of the Water Power Company as to the way the holders of non-permanent power were treated in regard to restricted days?

A. I have heard in the testimony—

Mr. BROOKS. Wait a moment.

The CHAIRMAN. Just answer whether you have received any such information or not.

Q. Whether you did at the Water Power Company, from any officials in regard to the treatment of holders of non-permanent power—apart from the testimony? A. Not for non-permanent power alone.

Q. Not for non-permanent power alone, did you say? A. Yes.

Q. Have you in the testimony in the case obtained any information from the witnesses for the Water Power Company as to the way the holders of non-permanent power are treated?

Mr. BROOKS. That should be yes or no, I suppose.

Mr. GREEN. In regard to the restrictions.

A. Only what I have heard in testimony.

Q. Whether or not you have taken into consideration the statements given in testimony in this estimate which you have made? A. I have.

Q. And what have you assumed from their testimony in making these estimates?

Mr. BROOKS. That we object to.

The CHAIRMAN. We can assume as well as he can on that. You can ask him any hypothetical question relating to that if you desire to. He has read the evidence. You have a right to ask him, from the evidence of the petitioner put in upon that subject, what effect that has had upon him, or what conclusion he could derive from a certain specific thing. On that same principle you could recite all this evidence that has been put in.

Mr. GREEN. It seemed to us that, having given his opinion as to the value of this water power at \$50,000 bonus, and measured water at so much a year, that he can state the facts which he has assumed, or the assumed facts which he has had in mind in forming that opinion.

The CHAIRMAN. He says he is dependent for that upon the evidence of the petitioners.

Mr. GREEN. Now I ask what fact he has understood,—what is that fact he has taken into consideration.

The CHAIRMAN. What do you say to that, Mr. Brooks?

Mr. BROOKS. Of course, he has got a right to state what facts he has taken into consideration; but I do not understand he can say he has taken into consideration certain testimony and pick out the pieces of testimony. They may or may not be facts.

The CHAIRMAN. We will allow the question. Go ahead.

Mr. BROOKS. If this develops as testimony, we want to be heard on this.

A. The average number of days which the Parsons Paper Company No. 2 was restricted was 22.2 for the years 1894 to 1898 inclusive, and the Linden Paper Company 24.13, and the average of those two is 23.16; and I have assumed that the electric light plant would be put on a parity with these two mills which are using non-permanent power, and the days of restriction would be 23.

The CHAIRMAN. He has already stated that, Mr. Green.

Mr. GREEN. Yes.

Q. What other facts in regard to the use of water power, Mr. Main, have you taken into consideration, if any? Allow me to refer to page 22½ of your schedule. A. I have assumed that water is to be furnished free up to one-quarter of a mill power for steam-condensing purposes during days of restriction when there is water in the canal.

Q. And the days of restriction as already stated. Now supposing that, instead of being on a parity with the mills already alluded to, the Dickinson and the Linden, that the City of Holyoke only had water after these quantities had been used —

Mr. GOULDING. I object to that.

The CHAIRMAN. Is that your question?

Mr. GREEN. I have not finished it. All the water set out, the mill powers of water, and described in a schedule of leases of water power at Holyoke, Exhibit 129, opposite page 68 of Vol. IX. Examine that, please, and see what that is.

The CHAIRMAN. Is that your question?

Mr. GREEN. No, that is only part of it. I am waiting for him to examine that. The witness will want to examine it for a moment. I did not anticipate an objection to this question. We can adjourn, as it will take him some few minutes to go through it and check it up.

The CHAIRMAN. All right, sir.

(Noon recess.)

AFTERNOON SESSION.

CHARLES T. MAIN, *resumed.*

Direct examination by Mr. GREEN, continued.

Q. Mr. Main, did you ever make an effort to find out whether there were any records in the Water Power Company's office or elsewhere that would show the amount of water available for water power in the river at the connection with the water development of the Water Power Company? A. I tried to find such information. I found there the flow of the Connecticut River, but that was not sufficient to give me all the information which I needed to show me how much water was used,— what is left after certain amounts are taken.

Q. Then whether or not you could find the amount of water available for water power? A. I could find from the flow of the river the total amount of water which would be available for water power for different parts of the year,— the total amount.

Q. But why doesn't that answer the question?

Mr. BROOKS. I object to that question.

Q. Wherein does that not tell us the amount of water available for water power in the canal system? A. It does tell us the total, the gross amount, which could be used at various months in the year.

Q. Then does it tell you the amount that is daily available? A. I think it does. I am not sure. I am not sure whether the record is kept by months or whether the record is kept so that the daily flow could be ascertained.

Q. That is the flow of the river; but does that tell you the amount of water that is available for the canals? A. Yes, it shows the total amount which is available.

Q. What do you mean by total amount? A. The total

amount which is flowing down over the dam. It does not show the amount which is used.

Q. Does it show the amount which is usable in the canals?

A. Yes, I think it does.

Q. Is there any record kept of the amount of water used by the lessees already using the water?

Mr. BROOKS. I object to the question.

Q. Or were any shown you? Did you look for any? A. I saw records that showed the amount of water used by some of the mills, similar to these records which we have seen this morning.

Q. Now will you assume that the City of Holyoke under the proposed lease will not receive any water until these quantities have been satisfied: First, the rights already acquired on the upper canal and South Hadley Canal. Second, the 17 mill powers used by the Holyoke Water Power Company on the upper canal. Third, the rights already acquired in the second and third level canals in excess of that used on the upper canal. Fourth, 50 per cent. in excess of the first three quantities. And, further, assume that the first three quantities are correctly set out in a certain schedule of leases of the water power at Holyoke, marked Exhibit 129 in this case, in Vol. IX., opposite page 68, and tell us if, upon that assumption, your valuation as heretofore given would be affected?

Mr. BROOKS. I object to it.

The CHAIRMAN. Do you want to be heard on it, Mr. Brooks?

Mr. BROOKS. Yes, if there is any special doubt on it. I don't think it is competent.

The CHAIRMAN. All right. Go on, Mr. Brooks, we will hear you. Of course, it is one of those questions that can be argued better later, and goes upon assumptions which are perhaps, it seems to me, evidence in the case—I don't know.

Mr. BROOKS. We will take the attitude that it is not competent. This question is not competent, assuming what my friend assumes in his question. I do not know that there is any basis for the facts of the assumptions that are made in the question of Mr. Green.

Mr. GREEN. I don't hear you.

Mr. BROOKS. I say I don't know that there is any basis in the evidence for all the assumptions you have made in this question.

(The question was read.)

The CHAIRMAN. Do you still want to be heard on that?

Mr. BROOKS. No further than I have stated.

Mr. GOULDING. This is a mere attempt, as I think, to get in matter on account of which this Court adjourned, because it thought the evidence was not competent when presented in the form of a written statement. On the written statement that was submitted I remember of addressing the Court on this very point, on these assumptions that involved constructions of the lease; and the Court was then of opinion that it was very clear that the schedule then presented was not competent. I do not see how it is competent now orally if it was not competent as a schedule. It was not because the schedule was in writing that we objected, but because the kind of assumptions involved the construction of a written instrument which the Court will have to construe in the end.

The CHAIRMAN. We understand that that schedule was left out because it was objected to particularly on the ground that it was too elaborate, in the nature of an essay rather than a schedule. I do not remember that we passed on this question. Personally, I do not see any reason why this question could not be answered. We will admit it, Mr. Goulding, and have your rights saved.

Mr. GOULDING. I should like to understand on what principle the evidence goes in, if I could. Your Honors will observe that there has been absolutely no attempt on the part of this witness to tell us what the amount of water flowing there is or what the usable quantity is; but he is going to assume certain things that are put in his mouth, and then he is going to say that his valuations are affected.

The CHAIRMAN. We think it is competent.

Q. What is your answer?

Mr. BROOKS. We will save the question.

A. Why, my valuations are affected.

Q. Can you tell us on that assumption what would be the value of this non-permanent power?

Mr. BROOKS. That we desire to save.

The CHAIRMAN. That is a more troublesome question.

Mr. GREEN. We say, may it please your Honor, that we have assumed in this question a state of facts which we shall argue exists and are in evidence.

The CHAIRMAN. Will you recite that state of facts, because you simply call our attention to the schedule.

Mr. GREEN. I will tell you what that question includes. If your Honor will turn to Vol. VIII., page 276, you will find that the lease says that we shall have "the right appurtenant to the land aforesaid to take and use 16 non-permanent 24-hour mill powers, as hereinafter limited and described, from the grantor's upper level canal, whenever, in the opinion of the hydraulic engineer of the grantor or of such other officer or agent of the grantor as may have the matter in charge, there is sufficient water flowing in the Connecticut River per second to permit such use in excess of the sum of the four quantities named hereafter."

The CHAIRMAN. You are going to start a discussion here that is going to involve the whole construction.

Mr. GREEN. If you will pardon me, I think not. The four quantities, to which we shall later on argue that we are subordinated, are the four quantities there named, and the four quantities we ask him to assume. That brings us to page 68 of this Vol. IX. Then in Vol. IX. there is a list of all the leases of the Holyoke Water Power Company, a list produced by the Water Power Company through Mr. Gross, setting out the mill powers that have been leased, both permanent and non-permanent.

The CHAIRMAN. Excuse me if I interrupt you. What is the purpose of your question,—to get this witness to say, inasmuch as there are certain things that you claim to be a burden upon the value of this water power, how much on account of those burdens the water power is lessened in value?

Mr. GREEN. What effect it will have, whether lessened or not.

The CHAIRMAN. He has stated that it would affect it. Now your question is how much, isn't it?

Mr. GREEN. Practically; what effect it would have upon his judgment. What, in his opinion, in other words, is it worth if those things are true? Our friends have offered in evidence certain testimony in regard to what this water power, non-permanent power, is worth; and it is all based on the assumption that there will be no more restricted days in the future than there have been in the past, but that we will all be treated on a parity. That is the assumption that the witnesses have gone on. That is purely an assumption, which we shall later on argue to the Court is not guaranteed to us by the lease. Now he has given a value entirely on their own assumption so far. He has taken their own figure, 23 restricted days, and assuming we have no more restricted days.

The CHAIRMAN. Now you say, if these other things happen, it will lessen the value. How can he tell that? Whose opinion is worth anything on that? Why is one man's opinion worth more than another's?

Mr. GREEN. It occurred to me the opinion of a water expert might be worth more than that of another man.

The CHAIRMAN. If your data are so connected or related to the fact, of course his judgment on a general topic ought to be so; but here are certain things. Go on with your discussion. I was only going to see if I couldn't narrow it down.

Mr. GREEN. I see what is running in your Honor's mind, and it has run in ours also, and it has seemed to us it is one of the vaguest things on the face of the earth; but, after all, in order to get it before the Court in some definite form, I thought I would ask some questions of a man who is an expert.

(The question was read by the stenographer, as follows: "Can you tell us on that assumption what would be the value of this non-permanent power?")

Mr. GREEN. I should like to add one more assumption to those that I have asked you to make, Mr. Witness; and that is, that all permanent power in the first level canal has been leased.

The CHAIRMAN. On the assumption that it has?

Mr. GREEN. Yes, I would like to add that assumption to those already given. Have you got the question, Mr. Main?

The CHAIRMAN. Mr. Goulding, what do you say about this?

Mr. GOULDING. I say it is not competent. It is nothing in the world but the construction of a lease by a witness who is only an expert on hydraulics. He doesn't pretend to have undertaken to measure the water that flows in the river at all, as I understand it; and he might put evidence in from which it might be argued that some construction of the lease would affect the value in some way, and some other construction of the lease would affect it in some other way, but he is really, in effect, asked to put a construction on the lease as one of his assumptions.

Mr. GREEN. I fail to see how the witness puts any construction on the lease at all.

The CHAIRMAN. My trouble about it is that it is so vague and difficult.

Mr. GREEN. We think it is a very practical thing. We think, if this Commission has any authority to sell us water power, it ought to know what it is selling us, and that, unless when it gets through with this case it knows what it is selling us, the power ought not to be valued; and, therefore, we would like to get at the question of what it is worth, if the lease is construed strictly, if we are subordinated to the quantities to which the lease says we are subordinated.

The CHAIRMAN. The stenographer can give us a copy of that question and the question now before us, and we will consider it this evening. Go on to something else.

Mr. GOULDING. Of course, on the question as to the knowledge of this Commission of that which they are selling us, we expect that they shall get a knowledge of it by competent evidence. As my friend put it a few minutes ago, doesn't it resolve itself into this, that "the petitioners here have put a wrong construction upon this complicated instrument, and I have been giving an opinion on that erroneous construction; and now I will give an opinion, if you want one, on the correct construction of this lease"?

The CHAIRMAN. Well, Mr. Goulding, I don't see that exactly, because I take it that, although a lease may be involved, counsel can interrogate a witness and assume certain things. If those things turn out not to be true, that destroys the quality of the evidence, and the evidence becomes of no value; but, assuming we have to take the view assumed in that question, why, I do not see that it calls upon the witness to construe the lease. The only difficulty in my mind is, what is the use of it after we get it?

Mr. MATTHEWS. Before your Honors pass upon that, may I be permitted to suggest to the Court how it strikes me, particularly with reference to the last suggestion of the Chairman as to the practical use of this alternative estimate or opinion of value? It is possible, we will assume, that the proposed lease should be construed in one of two inconsistent ways,—either as entitling the City, if it takes the lease, to share with all the other lessees of non-permanent power upon an equal footing with them,—*i.e.*, upon a parity,—or, in the alternative, as compelling us to pay for water power which is subordinated to the quantities which the prior lessees are entitled to. Now the Commission, I suppose, is not prepared at the present moment to pass definitively upon this question of construction. If it is, then I think there would be some force in Mr. Goulding's and Mr. Brooks's objection. We should have to confine our question to the construction which the Commission put upon the instrument. But, as the case stands at present, I do not understand that the Commissioners have decided the meaning of the proposed lease one way or the other. Therefore it is necessary for us, to present our case intelligibly in the closing argument, to put in our valuations on the two alternative theories. Now the witness has given a valuation on one theory; and all that Mr. Green is now asking him to do is to give a valuation on the other theory. As to the practical difference, that would depend, I think, entirely upon the witness's answer. He has stated, upon one theory of construing that lease, that the privilege of drawing or using measured water is worth \$50,000. Now the value of the alternative estimate will depend upon what it is.

The CHAIRMAN. Go on, Mr. Green, with something else.

Mr. GREEN. Yes, sir.

Q. You have prepared a summary of the values as they are found in your various schedules. I do not know whether there is any objection to our offering it as a matter of handy reference or not. It is simply tabulating the results. Have you before you the result of those valuations? A. I have.

Mr. BROOKS. Valuations of what?

Mr. GREEN. That he has given on the various assumptions of bonus and rent. We have them, and I intended to have them put in the form of a schedule so as to get them in a handy form.

Mr. GOULDING. What do you mean, a summary of these several schedules?

Mr. GREEN. Yes, a summary of the various schedules in a tabulated form for convenience. That isn't in the loose leaf, is it? You only have it bound in your notes?

The WITNESS. Yes.

Mr. GREEN. I would like to have you gentlemen examine this. I will take out the one I have. I should like to offer it. (Handing paper to counsel for petitioner.) See if you object to it.

Mr. BROOKS. Oh, yes, we object to that.

Q. For the purposes of its use at an electric light station, whether or not, in your opinion, a purchaser could afford to pay \$4,500 bonus for 16 mill powers and \$1,500 per mill power per year rental for 16 mill powers, with 41,289 square feet of land, the power to be used for electric lighting?

Mr. BROOKS. I object to that question.

(The question was read.)

Mr. GOULDING. That we object to. It is not a question of what a purchaser could afford to pay under peculiar circumstances.

The CHAIRMAN. We do not think that is admissible.

Mr. GREEN. Very well. I presume very likely it is not in the form in which it is put.

Q. What, in your opinion, is the fair market value of the

41,289 square feet of land offered, with 16 mill power appurtenant, for the purpose of its use in connection with the electric light station, at \$4,500 bonus per mill power for the 16 mill power, and \$1,500 per mill power per year rental?

Mr. BROOKS. We object to that.

The CHAIRMAN. I think that has already been admitted.

Mr. BROOKS. I think we saved an exception.

The CHAIRMAN. It passes on the commercial valuation of the property. I think at one hearing that that very question was admitted.

Mr. GREEN. I do not think so. A similar question was admitted, but I don't know that that question was.

The CHAIRMAN. Well, I am not certain, but I have the evidence here before me. Without going into it, we will admit it subject to objection. I do not mean to say by this that we think this man is competent to testify as to the value of land. As I understand this question, it is the valuation of the power for a commercial enterprise up there in relation to an electric plant that you are trying to get at.

Mr. GREEN. If your Honor please, your Honor after discussion has admitted Mr. Main's qualifications and permitted him to testify as to the value of the land and water power appurtenant. Your Honor will find it in the discussion.

The CHAIRMAN. Very well: then why do you put it again?

Mr. GREEN. Because there is only one issue in the question. This question has got other factors in it.

The CHAIRMAN. Mr. Brooks, you say you want to be heard.

Mr. BROOKS. It seems to me, may it please your Honor, that this question is not competent. He is asked what, in his opinion, its value is for running an electric light station.

Mr. GREEN. I said to be used in connection with it.

Mr. BROOKS. An electric light station.

The CHAIRMAN. That is exactly the question we allow him to testify to on page 1951 of the stenographic report. You asked this question: "Will you state, in your opinion, what is the fair market value of the land and water power privilege

and the water power of the Holyoke Water Power Company, used in connection with its electric light business, for the purpose of running an electric light station, with a right to draw up to 16 mill power, and paying for the water drawn and measured at the rate of \$1,500 per mill power per annum?" Go on.

Mr. BROOKS. He has gone through with the various propositions, I agree, and he has this morning for that matter; but now my objection is that the question cannot properly be propounded to him: it cannot be admissible as to what, in his opinion, the value of this land and water power is in connection with an electric light station. It must be for this electric light station, and this electric station producing as this electric light station produces.

The CHAIRMAN. I supposed the question did relate to this electric light station.

(The last question was read by the stenographer.)

The CHAIRMAN. You are asking now for the market value of the land. If that is your question, I do not think it is competent.

Mr. GREEN. The land and the 16 mill power appurtenant.

The CHAIRMAN. You have got the evidence in. I don't quite see why you want to mix it up with the question that is identical with this.

Mr. GREEN. I don't know but that is so. I do not know, however, but that I will withdraw this question. Just a moment, if you will permit me to consult with my colleague; but I asked an entirely different question before. The only question I asked before was on measured water and at measured water rates.

The CHAIRMAN. Let me read again the question to you which has already been answered by the witness:—

Q. "Will you state, in your opinion, what is the fair market value of the land and water power privilege and the water power of the Holyoke Water Power Company, used in connection with its electric light business, for the purpose of running an electric light station, with a right to draw up to 16 mill power, and paying for the water drawn and measured at the rate of \$1,500 per mill power per annum?"
A. \$50,000."

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Now what is your question?

Mr. GREEN. My question changes the assumption to this, that a purchaser is to pay \$4,500 bonus, and to pay \$24,000 a year rental.

The CHAIRMAN. He has already answered that this morning, unless I am very much mistaken.

Mr. GREEN. As a matter of fact, in order to prevent discussion, I am prepared to withdraw this question because it is all in. It is merely a summarization.

Q. Have you made a comparison, Mr. Main, of the cost of power at this plant with the gross receipts? A. I have.

Q. Have you observed that in Vol. II. of the evidence, at page 171, Mr. Prichard states that the cost of power should be 25 per cent? A. He states that the cost of power in an electric station should be about 25 per cent. of the gross receipts with compound condensing engines.

Q. And did you ascertain from Vol. I., page 219, what Mr. W. H. Foster claimed the gross receipts of the electric light plant were for the year ending June 1, 1898? A. I did. I found that he said they were \$56,600.

Q. And, on the basis of 25 per cent. for power, what should be allowed for power?

Mr. GOULDING. We object.

Mr. GREEN. That is, I just want a mathematical computation, that is all. You do not object to his making it?

Mr. GOULDING. You want an argument, I suppose, that you can submit as you go along.

The CHAIRMAN. Inasmuch as it is objected to and we can make that computation, it is not competent, as we understand the rule.

Mr. GREEN. I suppose so.

The CHAIRMAN. It is objected to, and I cannot help it.

Q. We will assume for a moment that 25 per cent. of 56,600 is \$14,150. Will you add to \$14,150—make the computation for us—interest on the land which you have assumed cost \$5,000, and the fixed charges on the compound condensing plant, costing \$58,950: what would that come to?

Mr. GOULDING. I object.

Mr. GREEN. This witness has testified without objection to the interest on an investment in land and the fixed charges on the compound condensing plant costing this amount. I thought he could add the two together for us.

The CHAIRMAN. Very well. If they object, we can do it. I do not know of any rule that allows it if they object.

Mr. GREEN. I withdraw the question so far as asked, and ask this question :—

Q. If the cost of power in this plant were 25 per cent. of the gross receipts, and the gross receipts were \$56,600 for the year ending June 1, 1898, what would be the value of the land and water privilege if the water was paid for, measured as used, at the rate of \$1,500 per mill power?

Mr. BROOKS. We object to that.

Mr. GREEN. I want to change that first sentence into "If the cost of power should be 25 per cent."

The CHAIRMAN. Well, as I understand your question,—I may have gotten it all wrong,—it should be as it is.

Mr. GREEN. The question is based on something that appears in the cross examination of Mr. Prichard in the second volume, where he says that the cost of power should be 25 per cent. of the gross receipts. Now we say, if that is true, if the cost of power should be 25 per cent. of the gross receipts, and the gross receipts were \$56,600, then what is the value of the land and water privilege, if we pay for the water measured?

The CHAIRMAN. If what? If what?

Mr. GREEN. If we pay for the water measured at \$1,500 per year per mill power.

Mr. GOULDING. I cannot see the ratio here. For instance, he begins by saying, "If the cost of power is 25 per cent. of the gross receipts, and the gross receipts were \$56,600." Why not start with the proposition that the cost of power is so many dollars? What is the use of putting in the gross receipts? 25 per cent. of the gross receipts is a given sum: why not start with that? I do not see what relativity there is between the given sum, which is 25 per cent. of the gross receipts, and the fact that we pay for the power, as he says, at \$1,500 a mill power, metered or as it is used. Now what is the value of the

property on such an assumption? I submit that it is not obvious what that means. Perhaps my friend can explain it.

Mr. MATTHEWS. If your Honors please, Mr. Prichard testified to the value of the plant upon certain assumptions, and on cross examination one of his assumptions turned out to be that the cost of power should be 25 per cent. of the gross receipts of the Company. It is certainly competent for us at some stage of our case and in some manner to show the application of Mr. Prichard's theory to the evidence in the case as we understand it. I take it that we might reserve it for final argument, and make a mathematical oration which should occupy a week, perhaps, done by a layman, and which neither the Commissioners nor the other side would have the opportunity to see in print before the final argument. I take it that the same objection might be raised against all these interlocutory calculations that have been made by the witnesses upon both sides. Take, for instance, the comparison of the cost of steam and water power, which we admit is a very valuable factor in the determination of the questions at issue in this case, and which have been made by all the witnesses upon the other side and will be made by ours. They might be made in the argument; but it is not customary to do so. It would take a great deal longer; the result would not be notified to the other side; and the details would not be presented to the Commission with the same force as if submitted from the witness stand. I do not see that any objection can be made to this and similar calculations that might not have been made to all the interlocutory calculations that all the witnesses on either side have made so far.

The CHAIRMAN. In the first place, I do not understand the question. I think I have understood your theory, Mr. Matthews, and followed it.

Mr. MATTHEWS. This is an interlocutory matter, as I have said.

The CHAIRMAN. The only contribution this question has so far on my mind is to confuse what I had supposed I had already understood, but you will have to straighten it out for that reason. I am in the air on this.

Mr. MATTHEWS. I think that is readily explicable, because this is an incidental matter which has not been referred to yet. Mr. Prichard, one of the witnesses on the other side, laid down the abstract theorem that the cost of power —

The CHAIRMAN. I understand.

Mr. MATTHEWS.—should be 25 per cent. of the gross receipts. Now, then, let us apply that. We have not tried to yet.

The CHAIRMAN. Why, you can apply it, and I can, as easily as rolling off a log.

Mr. MATTHEWS. How?

The CHAIRMAN. Up to a certain point.

Mr. MATTHEWS. Yes.

The CHAIRMAN. You take the gross income, don't you?

Mr. MATTHEWS. Yes.

The CHAIRMAN. Call it \$80,000.

Mr. MATTHEWS. Yes.

The CHAIRMAN. That would be \$20,000, wouldn't it,—\$20,000 up to that point? That is, your fuel — your power — ought to cost you \$20,000 —

Mr. MATTHEWS. Not fuel.

The CHAIRMAN. I mean power. Well, what are you going to do when you get there?

Mr. MATTHEWS. \$14,150, taking the figures in this case rather than those suggested by your Honor —

The CHAIRMAN. That is what it ought to be?

Mr. MATTHEWS. That is what Mr. Prichard says it ought to be.

The CHAIRMAN. Now your claim is \$20,000 or \$25,000?

Mr. MATTHEWS. No, sir.

The CHAIRMAN. Isn't it?

Mr. MATTHEWS. No, what we want to do now is to use that \$14,150, to figure out, if we can,— and we think we can, or the witness can if we cannot,— what, upon that assumption, is the market value of the land and privilege. We would like to ask the witness that question; and then he can explain the process. I cannot very well explain the matter in detail without anticipating what the witness will say; and I do not think I ought to do that.

Mr. COTTER. This witness, as I understand it, has already expressed an opinion of value; that is, his opinion. It is very evident that he disagrees with Mr. Prichard, that his valuation is not the same as Mr. Prichard's. Our query is, is it worth while for him to go on and give the reasons why some other witness was wholly in error? He already tells us that he reaches a different conclusion, puts a different value on the plant.

The CHAIRMAN. He puts a value on the property, it seems to me, which is quite different from the valuation put on it by Mr. Prichard.

Mr. GREEN. Your Honor may find, if he should figure out Mr. Prichard's 25 per cent., it would come pretty close to Mr. Main's valuation of this land and privilege. That is all the question is. Can counsel compute this as well as a gentleman who is in the habit of computing power questions?

The CHAIRMAN. I don't understand the whole business from beginning to end.

Mr. GREEN. It seems to me it amounts to this, and only this. We start with the proposition that power should cost 25 per cent. of the gross receipts, and we find out how much money is applicable to power. In order to have your power cost no more than \$14,150, how much money can you afford to pay for land and water privilege if you pay for measured water? That is, we pay for measured water, 3.36 mill power, at \$1,500 rental, somewhere about \$4,500. We have got so much more money left over that we can afford to apply to land and privilege.

Mr. GOULDING. In the first place, there is an element in one that is not in the other: that is land. Mr. Prichard says, in his opinion, the electric light plant ought to be run for 25 per cent. of the gross receipts for power. Now you want to compare that with some land, on which you can put your buildings and which has a right to certain force from the water. It seems to me that the two things are incomparable.

The CHAIRMAN. I think, if I retired into my closet and read the question over for fifteen or twenty minutes, I might understand it. I think we had better hang that up until to-morrow morning.

Mr. GREEN. I would like to suggest that this is the first statement we have had from counsel on the other side that land has any value as land. Heretofore, in treating of it, whenever they bought water power, they got the land, and paid for a bonus. I have another question that will be akin to this.

The CHAIRMAN. Go on, Mr. Green.

Q. Assuming now, for a moment, that the running expenses should not exceed 60 per cent. of the gross earnings, and assuming that the gross earnings are \$56,600, what is the value of the land and water privilege appurtenant, if the water is paid for measured at the rate of \$1,500 per annum?

Mr. BROOKS. We remain constant, may it please your Honors.

The CHAIRMAN. One very serious defect, in my judgment, in your question, is, you assume that certain receipts, earnings, have been made from the plant. Then you ask the valuation of part of the plant; you ask for the value of the land, and so forth and so on, on the strength of certain receipts which are earned as much from one part of the plant as another, if I gather the meaning of your question.

Mr. GREEN. Yes, sir, that is true; but there are figures which the witness will produce to back up his statement.

The CHAIRMAN. Can't you tell me what all this means?

Mr. GREEN. Certainly, if you will permit me. I have no doubt I am very awkward about it. It all amounts to this, if your Honor please. We say that certain statements which have been made by various witnesses on the other side substantiate Mr. Main's valuation of this land and privilege. One witness says 25 per cent. of the gross receipts. We say that, worked out, will produce a result which supports Mr. Main's figures. Mr. Humphreys and Mr. Robb stated that the running expenses of the plant should not exceed 60 per cent. of the gross earnings. We say if we pay for this water measured at the rate of \$1,500 per annum per mill power, in order that the running expenses should not exceed 60 per cent. of the gross earnings, then only the sum stated can be paid for land and water privilege, all the fixed charges and everything else being taken into consideration.

Mr. GOULDING. I submit that any such evidence as that for any such purpose is not competent to be put in by an expert. It is simply utilizing the expert to argue your case for you. The argument may be more or less cogent, but I submit that an expert cannot take up the evidence of somebody on the other side, and reason out that his statements based on other grounds are verified, fortified, by that other evidence. It is a very proper thing to do in argument, but an improper thing to do in evidence, it seems to me.

Mr. GREEN. It seems to me in principle it is the same as many calculations that have been put in.

The CHAIRMAN. I can't understand this question, and I didn't understand the other. I don't understand the theory. It is probably because I am very stupid. You have been allowed to put in the value of this plant in the whole, affected by conditions there, in commercial enterprise. Now, if these questions relate to that, it seems to me the premises don't at all fit the proposition you are trying to carry out. I can't connect them. I can't see why it is if they happen to have 60 per cent. of their expenditures, only 60 per cent. gross earnings, why that should give you any criterion to tell the value of the land, and I don't believe it does.

Mr. MATTHEWS. The valuation of power, if your Honor please.

The CHAIRMAN. Power? I thought you were asking for the land.

Mr. MATTHEWS. Because what we are asked to pay as a bonus is paid for power including land. The bonus which is to be paid in this case is paid for the right to draw water, together with the land.

The CHAIRMAN. Let me analyze this question. If the cost of power in this plant should be 25 per cent. of the gross receipts, and the gross receipts \$56,600,—the cost of power for the year ending June 1, 1898,—what would be the value of the land and water privilege, if the water was paid for measured as used at the rate of \$1,500 per mill power? I fail to see the connection between these two things.

Mr. GREEN. Your Honor perceives we start on the under-

standing that the land and water power appurtenant is treated as part of the cost of water power. They want for their water power practically \$4,500 per mill power. That includes, incidentally, land. They also want \$1,500 a year rental per mill power.

Mr. COTTER. You do not expect to obtain anything more from this witness, after all, than his opinion of the value of this property, or some part of it?

Mr. GREEN. We expect this much, may it please your Honor. We want to show this connection: that the statements made by the witnesses on the other side support our contention in this case and the contention of our witnesses. A witness takes the stand, and says that power should not cost more than a certain amount. If that is true, how much ought this power to cost us, if we are to take it? Well, our theory is, and anybody's theory would have to be, the more you pay for rental, the less for land, and *vice versa*. So we assume a measured rate for water. Then, in order to have this power cost us no more than 25 per cent. of the gross receipts, how much can we afford to pay as a bonus? Let me put it that way, instead of saying land and water power. How much can we afford to pay as a bonus?

Mr. COTTER. You do not understand, Mr. Green, that the present witness agrees with or indorses the statement by the witness Prichard?

Mr. GREEN. I don't understand that he agrees with his valuations, but sometimes gentlemen when stating a general rule come near the facts of the case. We are trying to work this thing out. I say that in cross examination Mr. Prichard made certain admissions. I may be entirely wrong about it. Mr. Goulding says I am, but that is as I understand it. It is on that basis that we desire to ask the question.

Mr. COTTER. I assume that the witness is not in accord with the testimony of Prichard, and, that being the case, would it be worth while to pursue a theory of the case that he didn't believe in?

Mr. GREEN. Mr. Prichard made a statement under cross examination as to what power should cost. We claim that it

works out so approximately close to Mr. Main's as to support him.

The CHAIRMAN. Let me make a suggestion. Why doesn't your question answer itself? It probably doesn't. But if the cost of power should be 25 per cent. of \$14,000, shouldn't the value of your water privilege be \$14,000?

Mr. BROOKS. That is on the basis of present production, your Honor?

Mr. MATTHEWS. Other things enter into the cost of power.

Mr. GREEN. That would be so, if your Honor please, but how is that to be applied?

The CHAIRMAN. Applied so that we can make it clear, so that we can get out of it.

Mr. GOULDING. I want to interject this other objection here. That is, an expert witness can't bolster up his own evidence, or verify it, or fortify it, by deducing results from the evidence of witnesses on the other side. That is a general proposition. It may be the function of counsel, but it is not the function of an expert witness.

The CHAIRMAN. I think Mr. Matthews has something to say on this.

Mr. MATTHEWS. Possibly I can't add to the interest of the occasion, or shed any light on the question, but suppose we put it in this form: Assume that the total cost for power (that includes all elements of power) should not exceed 25 per cent. of the gross receipts. Assume that we are to pay for the water, as measured, at the rate of \$1,500 per annum. Then what is the most that could be paid for the land and water privilege (that is, by way of bonus) in order that the total cost for power should not exceed 25 per cent. of the gross receipts?

The CHAIRMAN. I understand that.

Mr. MATTHEWS. The second proposition is this. Assuming that the total running expenses of the plant, for all purposes, should not exceed 60 per cent. of the gross; assuming, again, that we pay by way of rent for the water as measured at the rate of \$1,500 per annum; then, what is the most that could be paid by way of bonus for the land and privilege,

in order that the total running expenses of the plant should not exceed 60 per cent. of the gross receipts? There are the two propositions put together. I have re-formed them in that manner, not that I think it is an improvement on Mr. Green's form, but it may put the matter in a little different light. We are not trying to get the value of the land, as such, out of this witness at all. We are trying, for the time being, to get at the land just as the witnesses for the Company have, although that may not be the proper way. We are assuming that it is. We are assuming that some sum should be paid by way of bonus for the land and the privilege of drawing water, at a certain rent per annum. The witnesses for the Company stated that in their opinion the bonus should be \$72,000, on the basis of paying for the water \$1,500 a mill power for 16 mill power,— 8 or 16, as the case might be. They admitted, however, on cross examination, that the total cost for power should not exceed 25 per cent. of the gross income, and that the total operating expenses of the plant should not exceed 60 per cent. of the gross. Now, we claim that it is possible, as a mathematical proposition, to apply those admissions made on cross examination to the evidence in this case, and assuming a rent not of \$24,000 per annum, but simply for water as measured, to ascertain what could be paid on that assumption by way of bonus for the land and privilege, in order in the one case that the total cost for power should not exceed 25 per cent. of the gross, and in the other case that the total running expenses should not exceed 60 per cent. of the gross. I understand that it is perfectly competent, and that the only question is whether it must be done by counsel at the close of the case, or whether it can also be done by an expert witness upon the stand. We respectfully submit that the proper course is to permit those calculations to be made by experts, because they do not prove themselves. Many items must enter into this calculation that are not assumed. What these items are is within the special cognizance of the man who has made himself familiar with calculations and computations concerning the cost of power. We submit that such a question as this is in no manner different in theory from the question which is always directed to witnesses in water power

cases, asking from him to compute the cost of producing a certain amount of power by steam or water power, in comparison with each other. The same thing might be done, perhaps, by counsel; but it never is done in that way, and we submit it ought not to be left to be done to counsel, but that counsel are entitled to the assistance of these calculations, and that the Court itself is entitled to that information as the case proceeds. Otherwise, it seems to me, counsel on one side or the other, possibly on both, will be prejudiced, if these calculations are left to be made by them at the end of the case; because we as laymen, as lawyers, might be induced to include items, or omit items, from the computation, that ought to be omitted or included, as the case might be. We are entitled, it seems to me, and the Court is entitled, to derive assistance from the testimony of experts taken during the course of the trial as to the proper way to make these calculations. We don't see that the proposition now under discussion differs at all in substance, or even in detail, from the calculations we have had all through the case, and which are always used in water power cases, as to the cost of producing a certain amount of power by steam and by water power. If the questions in the form now suggested are any more intelligent, we should like to put them in that way.

The CHAIRMAN. I wish you would put them in that way, in the way that has just been suggested.

Mr. MATTHEWS. I hesitate to suggest it as an amendment to Mr. Green's form.

Mr. GREEN. You needn't have the slightest hesitancy on my account.

Mr. GOULDING. I should like to keep within the bounds of regularity, if possible, and I don't know as it is quite regular for me to make a suggestion now in general reply to Mr. Matthews. But I want to very properly suggest what seem to me insuperable objections to questions of this kind. In the first place, I submit that it would not be competent for Mr. Main, either in answer to a question or voluntarily, to say, "Mr. Prichard confirms my view, under my schedule number so. He confirms that view, because, don't you see that, if what Mr.

Prichard says is true, then A is B, and C is D, and then of course E is F, which is my proposition on my schedule?" Now, we say such a thing as that would not be competent. His evidence could not be confirmed and verified in any such way. If in the concluding argument counsel sought to trace those relations, it might be competent, but it could not be for the purpose really of crediting Mr. Main,—I say Mr. Main simply because he is the witness on the stand,—simply for the purpose of confirming him, to allow him to testify as to the effect of certain evidence given by an expert on the other side. Now, that proposition as a general one lies at the bottom, I submit, of the whole, as an answer to the whole thing. Then, here is another specific answer, particular answer, which occurs to me, and I submit as having great and decisive force, and that is this. You are taking a fraction of those receipts, which you say Mr. Prichard assumed to be the proper fraction for the cost of power. Now, he didn't include anything else but power. Your Honors will remember that was a thing Mr. Prichard had not included. He considered over night,—and all this was in cross examination, brought out in cross examination,—and concluded that for power he would say 25 per cent. of the gross, that is the fraction. Now, in the questions that you propose, in the series of questions that Mr. Matthews has produced, in the original question as Mr. Green put it, and in the conclusions that you are seeking to arrive at through this evidence, you are seeking to show what can be paid, not for power, but for power and land. It makes no sort of difference whether you say that we have put our case in. We have put our case in in the way of putting an estimate upon the value of that land connected with what is incorporeal, the right to take so many mill powers of water. But to say the value of that land as land, and to separate it from the mill and say what is the value of it, nobody has undertaken to say, and this witness undertakes to say. He proposes to say that for that land, the feet are given of the land, and the power, and the right to take so many mill powers, an incorporeal thing, for the two things you have got to pay so and so. You have got to pay such a bonus, and you have got to pay such a rental for the water, for the water

metered or measured. Now, what I say is, it is simply mathematically impossible to compare qualities with quantities. The ideas are entirely different, and the thing you are aiming at and are going to compare with this fraction that Mr. Prichard took is a thing very different in kind, and there is no quality that exists by which you can compare it. I respectfully submit there are two objections to this evidence that are conclusive.

Mr. MATTHEWS. Just one word, if your Honors please. I think that Mr. Goulding may be right in so far as he objects to any criticism, as such, of any other witness; but that is neither here nor there. This witness might not have the right to say that Mr. Prichard, for instance, backed him up or differed with him; but we have the right to seek to apply the admissions made by the witnesses upon the other side in cross examination to the facts of the case as we understand them, leaving the value of that application to be judged of by the Commission later. I would like to say that the estimate of 25 per cent. of the gross receipts as the proper allowance for the cost of power is to be found, as made by Mr. Prichard, Vol. II., page 171, and that the statements that the running expenses of the entire plant should not exceed 60 per cent. of the gross receipts were made by Messrs. Prichard, Humphreys, and Robb. I have not the references to their testimony.

Mr. BROOKS. Mr. Matthews, would you be kind enough to read that answer and the answers immediately previous to it of Mr. Prichard?

Mr. MATTHEWS. It is not only in that particular place, but scattered through his testimony. Of course, the weight which should be given to the witness's answer is open to discussion.

The CHAIRMAN. Can you readily turn to Mr. Prichard's answer about the 25 per cent.?

Mr. BROOKS. Yes, there it is. I wanted to call your attention to it. (Giving Vol. II. to the Chairman.)

The CHAIRMAN. (Reading.)

"A. That would be,—considering the testimony of Mr. Winchester, that the minimum load was 40 horse power, and the maximum load 552 horse power, and the price of coal at

Holyoke \$4 per long ton,—in my opinion it would be 25 per cent.

"Q. 25 per cent. of the gross? A. 25 per cent. of the receipts.

"Q. 25 per cent. ought to go for the power? A. For the cost of the power.

"Q. 25 per cent. of the receipts for power, in order to bring the Company out with a total operating expense of 60 per cent. of the gross? A. Yes, sir.

"Q. What do you mean by 25 per cent.,—25 per cent. of the total gross receipts or 25 per cent. of the 60 per cent. of the total gross receipts? A. 25 per cent. of the total gross receipts."

Mr. BROOKS. You notice, your Honor, that he speaks of coal there in his 25 per cent. estimate.

Mr. MATTHEWS. Certainly. He takes in the whole cost of power, and that is exactly what we propose to do.

Mr. BROOKS. Steam power, isn't it?

Mr. MATTHEWS. We propose to take Mr. Prichard on his own theory, and to show that, applying that theory of 25 per cent. as the proper proportion of the gross income of the Company applicable to power, you come out with a valuation for this power by way of bonus of a certain sum, which I do not feel at liberty to state at the present time.

The CHAIRMAN. Yes. I think I appreciate now your position. We will take that into consideration. Go ahead, Mr. Green, on something else.

Mr. GREEN. We have several more of the same kind.

The CHAIRMAN. Go ahead. We might just as well have them all out at once. You still insist upon keeping land in that question, do you?

Mr. MATTHEWS. Simply for the reason that they have done so themselves. We do not mean to assume in this question that the land, if your Honor please, may not have some independent value of its own; but for the purposes of this case, in view of the manner in which the question of water power has been presented by the other side, we are entitled to consider the value of the land as included in the bonus to be paid for the water privilege, because that is exactly what their experts have done, every one of them. I would say that we do not think

that is a proper theory; but that is what they have done, and we have taken them up on their own theory.

The CHAIRMAN. Now, Mr. Green, you may ask the next question.

Q. Have you made any computations to ascertain what would be the maximum amount that could be paid for water power in Holyoke for the purpose of running an electric light station, if no more was to be paid than was paid in Hartford?

Mr. GOULDING. I object to the inquiry.

Mr. GREEN. It is precisely the thing that they did themselves.

Mr. BROOKS. No, not at all.

Mr. GREEN. Of course, what I have asked him is, if he has made these computations.

The CHAIRMAN. What do you say? Have you, Mr. Main?

The WITNESS. I have.

The CHAIRMAN. Now, you want to know what they are?

Mr. GREEN. Based, of course, upon the figures submitted upon the other side,—submitted by Professor Robb, as I understand.

The CHAIRMAN. Question reserved. Go on with another.

Mr. GOULDING. It cannot be possible that anybody can claim that any such evidence as that is competent?

Mr. MATTHEWS. We will argue it in a minute, but there is another question of the same sort.

The CHAIRMAN. Go ahead. Mass them all together.

Mr. GREEN. We should desire to ask, he having computed it, what would be the maximum amount that could be paid in Holyoke if we are to pay no more than they pay in Hartford.

The CHAIRMAN. What is the next?

Mr. GREEN. We should like to ask what we can pay in Holyoke for water power for the electric light station if we are to pay no more than is paid by the United Electric Company in Springfield.

The CHAIRMAN. Have you any more of the same—

Mr. GREEN. No, I do not know as we have along that line.

The CHAIRMAN. Does that practically close your evidence?

Mr. GREEN. No, sir.

The CHAIRMAN. I mean, close this witness.

Mr. GREEN. No, sir.

The CHAIRMAN. Then go ahead on some other topic.

Mr. GREEN. There might be a different point involved, possibly, in these last two questions. Possibly before we adjourn, if your Honors are going to consider all this —

The CHAIRMAN. Well, personally, I do not like to tie up things: I would rather decide them as we go along, as I think so far in the case we have. We will take these questions under advisement. But if you have anything of the like character, you might just as well give it to us to-night.

Mr. GREEN. I have given your Honor, I think, all that is going to arise before to-morrow. I have some other evidence here, but I take it that it is not evidence that will be controverted. I may be mistaken.

The CHAIRMAN. All right.

Mr. MATTHEWS. Mr. Chairman, we should like to be heard on these last questions —

The CHAIRMAN. I understand —

Mr. MATTHEWS. But I am under some embarrassment by not having with me my notes of Mr. Robb's testimony.

Mr. BROOKS. Do you claim that his Hartford estimates were not brought out in cross examination?

Mr. MATTHEWS. I was saying that I was under some embarrassment relating to Professor Robb and the Hartford prices by reason of my not having my notes of Professor Robb's testimony here this afternoon; but I can state our case with reference to the Springfield matter offhand, because I happen to remember that. Mr. Anderson was called to the stand as an expert by the Company, and testified upon direct examination as to the value of the power which the Holyoke Water Power Company wishes us to take in this case, based upon the experience of and prices paid by the United Electric Light Company of Springfield. It certainly must be competent for us to show that he made an improper application of those facts,

and to show what a proper application would be. I do not think I need say anything more about the Springfield case. The Hartford case, however, is a little more complicated, from the fact, as I now remember it, that some, if not all, of the evidence relative to the prices paid in Hartford was elicited in cross examination. I should like to see my notes of his evidence before that question is passed on.

The CHAIRMAN. That you can hand to us this evening, can you not?

Mr. MATTHEWS. I cannot get the notes before four o'clock very well. On the Springfield case I have nothing further to say than what I have said. The Hartford case I wish the Commission would hold open till morning.

The CHAIRMAN. Well, Mr. Goulding, what do you say about this?

Mr. GOULDING. I say that the question that this Commission has to decide is the value of the property situated in Holyoke. I say that one of the elements of value is the value of power, to be sure; but the main question is the value of this property, this plant together, and that what it costs for power in Springfield, some other plant that is entirely different, situated entirely differently, is no criterion of what the power is worth in Holyoke. What it costs in Springfield is no criterion of what it is worth in Holyoke. What anything costs is ordinarily not evidence of its value; but what something else costs is not evidence of the value of the thing under inquiry ever. Of course, the evidence of Mr. Anderson was put in to show the possibility of applying water power to the production of electricity. I do not remember myself whether it was put in in direct examination or cross examination. My recollection about the Robb testimony was that it was put in in cross examination. I have no distinct recollection of Anderson's, at all, as to where it came in. But the proposition now is to undertake to show what you can afford to pay for power — pay for certain things — rentals, rentals of water or bonuses for the land and water — by showing what the cost was or referring to what the cost was in Springfield, in another plant. If anything is remote, it strikes me that that is remote. We object to it.

The CHAIRMAN. What did Mr. Anderson say, Mr. Matthews, if you have it there?

Mr. MATTHEWS. I have not. My notes of Mr. Anderson's testimony are at the hotel.

Mr. BROOKS. Mr. Matthews, is your memory certain that Mr. Anderson testified to this on direct examination?

Mr. MATTHEWS. Quite certain.

The CHAIRMAN. My memory is that way, too.

Mr. MATTHEWS. If Mr. Brooks disputes it—

Mr. BROOKS. I do not dispute you.

Mr. MATTHEWS. If there is any doubt about it, I would like to have this postponed till to-morrow morning, when I shall have my notes here.

The CHAIRMAN. My recollection is that Mr. Anderson was asked the question as to what the cost of power in Springfield was on direct examination, and then an attempt was made to show that there was a similarity between that power and this. Now, that being so, I do not see any reason why you should not be allowed to go into it, as far as that is concerned.

Mr. GOULDING. I wish your Honor would look that over before you come to any last conclusion.

Mr. MATTHEWS. I should be entirely willing to have that matter postponed until to-morrow.

The CHAIRMAN. Cannot you discuss it to-night? Will you give me Mr. Anderson's testimony?

Mr. GOULDING. Mr. Anderson's testimony is in Vol. V.

Mr. BROOKS. Beginning at page 223.

Mr. MATTHEWS. I have at the hotel a memorandum of what Mr. Anderson said on the subject, and what Professor Robb said on the subject. Unfortunately, I have not it here; but I would like to say a word about Mr. Goulding's general proposition. We disagree entirely with the proposition that evidence of the prices paid for water power in other communities is inadmissible. We say it is admissible.

Mr. GOULDING. I understood you wanted to show what power cost in those other places, which might be entirely different.

Mr. MATTHEWS. No, the price actually paid. The

price paid in Hartford and Springfield for water power under circumstances similar to those in Holyoke. The price obtained for water power in other places under similar conditions is admissible in evidence. So it was decided in the case of *Lowell v. County Commissioners*, 146 Mass. 403.

The CHAIRMAN. I have read that case.

Mr. MATTHEWS. I did not suppose that the proposition could be controverted for a moment. We propose to put in evidence, for instance, when we get further along, the prices paid for water power on the Merrimack River and elsewhere in Massachusetts, backing up such evidence by evidence of similarity of conditions. That similarity of conditions has already been shown by the witnesses on the other side, or attempted to be shown by them, with respect to the Indian Orchard water power that is used in Springfield, and with respect to the water power of the Farmington River Power Company used at Hartford. That is the rule of law, as I understand it.

The CHAIRMAN. The question here, Mr. Matthews,—let me see if I understand it. Put the question the way you have it in your mind, and then I can tell.

Mr. MATTHEWS. I find that I shall not need my notes at the hotel, because it seems that in one of the interlocutory arguments we have had in this case the information was furnished. If the Commission will turn to page 180 of Vol. VII. they will see the references to Mr. Robb's testimony and to Mr. Anderson's.

The CHAIRMAN. Perhaps you will read them.

Mr. MATTHEWS. I have not quoted them: I have simply referred to them.

Mr. BROOKS. In Mr. Main's "first edition" of the pamphlet, which was first —

Mr. MATTHEWS. Which was so ruthlessly excluded?

Mr. BROOKS. Yes. All his references to the testimony of Mr. Anderson with respect to the cost of power are references in the cross examination.

Mr. MATTHEWS. I am not responsible for Mr. Main's digest of his testimony. I rely on my own.

Mr. BROOKS. That is all right. He takes your cross

examination in every instance for the conclusions that he refers to, and I think correctly.

Mr. MATTHEWS. He may have done so, but I refer to the direct examination as well. If your Honor will take down the references, perhaps that may be the simplest way. Anderson, Vol. V., pages 228, 232, 233, 262-312, — fifty pages of it.

The CHAIRMAN. That includes the cross.

Mr. MATTHEWS. This is direct and cross both, — 320, 360-4, 368-373, 388-391, 355-7.

The references to Professor Robb's testimony are found on page 180 of Vol. VII. If you read that whole page, you will get the whole thing as it lies in our mind. We contend, if your Honors please, that, wholly apart from the fact that these references to Springfield and Hartford may have been put in by the other side, our witnesses can, as a matter of independent testimony, state to the Court the cost of water power in other places which are similarly situated for the purpose of showing the value of water power in Holyoke. The evidence of similarity, we claim, is in the case already in the testimony on the other side, and we might proceed to ask Mr. Main what was paid in Hartford, what was paid in Springfield, that is, the prices obtaining in those two towns respectively, but that also is already in the evidence and we do not care to put it in over again. We desire, however, to do for our side what the other side has done on its account, — apply those prices to the case of Holyoke.

The CHAIRMAN. Do you expect to run down the price of water power very much lower than they sell it at Holyoke on any general evidence?

Mr. MATTHEWS. We have had no general evidence of any sales at over \$600 a mill power.

Mr. BROOKS. We do not quite agree with you on that.

Mr. MATTHEWS. Well, to whom have you sold water power at more than \$600?

The CHAIRMAN. I do not speak of Holyoke, but outside.

Mr. MATTHEWS. I misunderstood your Honor. What was the question?

The CHAIRMAN. Outside of Holyoke.

Mr. MATTHEWS. What was the question, sir?

The CHAIRMAN. I say, Do you expect — I do not in the way I have put it assume that it is so or not — do you expect to show that water power in commercial centres is selling any cheaper than it is selling in Holyoke? I am not saying for how much it is selling in Holyoke.

Mr. MATTHEWS. I think that the evidence will be that, applying the prices of Springfield and Hartford, it will result in about the same values that Mr. Main gives, — about the same values.

The CHAIRMAN. It is quite difficult to transport the values of power per horse power. In that Lowell case that you speak of they allowed the expert to testify, and so we did in the Worcester case, — allowed experts to testify to the value of water power elsewhere to show the value at Worcester, and so they might at Holyoke or anywhere else. But it is hard work to show similarity.

Mr. MATTHEWS. Yes, it is not the same as evidence of actual sales of water power in Holyoke. Our contention is that there have been no sales of water power in Holyoke of the class that they propose to give us, and that the highest price they ever get for a better class of power is \$600 a year with no bonus.

Mr. GOULDING. I want to call attention to the wide and clear distinction between what water power sells for in the market as water power per horse power, — water power or other power, — and what it costs in particular places to produce it by a complicated arrangement. One may be competent evidence, while the other is wholly incompetent, as I submit.

Mr. MATTHEWS. Mr. Goulding, if you will pardon me, perhaps we are talking at cross purposes. We do not rely on any evidence of the cost to produce power. We rely on the prices paid in Hartford and Springfield, on the evidence of the prices paid by the electric light companies in those two cities, a different thing entirely.

Mr. GOULDING. I understand it is a price paid by the Hartford Company for an elaborate set of appliances that pro-

duce power, and the Springfield company, by taking power at Indian Orchard, produces power here, and Mr. Anderson testified about it. I do not know—I will not undertake to say now that he did not testify to what it cost them. That is not buying power in the market: it is producing it. It is their own power.

The CHAIRMAN. I think, gentlemen, if you can lend us the evidence this evening of Anderson and Robb, we can look it over.

Mr. MATTHEWS. Has not your Honor it?

The CHAIRMAN. We have the books here now. Can't we take them to the hotel?

Mr. MATTHEWS. Oh, yes.

Mr. GOULDING. You want what volumes?

The CHAIRMAN. The fifth and seventh. We have the first question written out all right. The other four we would like to have you formulate and pass to us this evening, any time when you get around to it.

(Adjourned to Wednesday, March 13, 1901, at 10 A.M.)

FIFTY-SEVENTH HEARING.

SPRINGFIELD, Wednesday, March 13, 1901.

The Commissioners met at the Court House at 10 A.M.

The CHAIRMAN. So far as the question that was put yesterday and objected to, asking the witness for his valuation of water power depending upon certain assumptions, we admit it. So far as the other four questions,—that is, the one relating to the 25 per cent. cost of power, the one relating to the 60 per cent., the one relating to Hartford, and the one relating to Springfield, we exclude them, believing that counsel can supply any of those computations. That is all.

Mr. MATTHEWS. Should not that apply to all computations made in the case, your Honor?

The CHAIRMAN. Not at all; not in the slightest degree. Take, for instance, the last two, that at Springfield and Hartford. It would be like trying a case of the valuation of real estate and asking witnesses with reference to recent sales of similar property, then, after that evidence was produced, asking each witness: "Now, such and such a piece of property brought \$10,000. If that property was sold for \$10,000, how much would this property under investigation be worth?" Those things must be left to counsel to argue. And in these other cases, as I understand it,—and I do not say this for the purpose of reopening any discussion, for the Commissioners think that the matter of schedules has been very elaborate in this case, and much can be left to counsel, unless to experts in many things,—in that very case, the 25 per cent. case, it may be suggested that there are certain elements that the Commissioners cannot appreciate at this time, but I cannot see for the life of me why not. If a certain rule be applied so that it makes the cost of power \$15,000 a year, I do not see why the Commissioners or counsel cannot take the evidence already in,

and state the conclusion to be drawn from that fact as bearing upon the value of the power used in this particular case. If perchance the cost of power here, we will say, has been \$30,000 instead of \$15,000, that certainly has a tendency, as I should say, bearing upon the valuation of this property. Now, inasmuch as all the elements have been stated, counsel can do that as well as experts. Otherwise, we shall be carried into an interminable number of mathematical problems, and the facts themselves can be taken care of. Common knowledge of things that the Court can do for itself may as well be done by them as to call upon experts to do it.

Mr. MATTHEWS. May we not have the same privilege that Mr. Anderson had?

The CHAIRMAN. What was that privilege?

Mr. MATTHEWS. Mr. Anderson was allowed to apply the Springfield prices to the case of Holyoke.

The CHAIRMAN. Did you object to it? If you had, we certainly should have excluded it.

Mr. MATTHEWS. I don't remember whether any objection was made or not.

The CHAIRMAN. You did not object to it, and I noticed it at the time. I saw it the other day.

Mr. MATTHEWS. Your Honor's idea is that we can elicit the facts, and that the conclusions must be drawn by counsel?

The CHAIRMAN. That the conclusion is not to be drawn by counsel?

Mr. MATTHEWS. Must be drawn by counsel.

The CHAIRMAN. Oh, no. You know just as well as I do that you have been allowed by this very witness to put in all the schedules and give his estimates as an expert bearing upon things that we think can be of service, but we have got to exercise some discretion with reference to the extent to which an expert can go, and we think that you have crossed the line on these four questions.

Mr. MATTHEWS. Can we ask an expert what elements are proper to be taken into account in making a comparison?

The CHAIRMAN. Certainly, and this witness has.

Mr. MATTHEWS. He has not yet in these questions.

The CHAIRMAN. In these particular questions, no : there is no need of it. You mean to say with reference to this particular question ?

Mr. MATTHEWS. Can we not show, by the expert testimony of a gentleman familiar with such computations as a matter of daily business, what elements are proper to be taken into account in making a comparison and calculation ?

The CHAIRMAN. Yes.

Mr. MATTHEWS. I think that will satisfy us. We would like, however, to save an exception to the ruling on those questions.

Mr. GREEN. I will take up, if your Honors please, the question admitted first.

CHARLES T. MAIN, *resumed.**Direct examination by Mr. GREEN, continued.*

Q. Mr. Main, will you assume that the City of Holyoke under the proposed lease will not receive any water until these quantities have been satisfied :

1. The rights already acquired on the upper level canal and South Hadley canal ;
2. The 17 mill powers used by the Holyoke Water Power Company on the upper canal ;
3. The rights already acquired in the second and third level canals in excess of that used on the upper canal ;
4. 50 per cent. in excess of the first three quantities ;

and further assume that the first three quantities are correctly set out in a certain schedule of leases of the Water Power Company at Holyoke, marked Exhibit 129 in this case, in Vol. IX., opposite page 68, and tell us upon that assumption or upon those assumptions, if your valuation as heretofore given would be affected ?

Mr. BROOKS. We want to save an exception to that question.

The CHAIRMAN. Very well.

A. It would be affected.

The CHAIRMAN. And then the next question, To what degree ?

Q. In what way and to what degree ?

Mr. BROOKS. That we want to save an exception to.

A. My opinion is that its only value would be its value for land merely.

By Mr. COTTER.

Q. What is that, Mr. Main ? A. The value would be its value for the land alone.

By Mr. GREEN.

Q. And the water used paid for in what way and at what rate ? A. Paid for —

Mr. BROOKS. Well —

The CHAIRMAN. That is admissible, Mr. Brooks, under the same ruling.

Mr. BROOKS. I had assumed that that was already in his question, because he asks him to take the lease.

The CHAIRMAN. Perhaps the witness did not follow that part.

Mr. BROOKS. Very well.

A. Paid according to the average amount drawn and used at the rate of \$1,500 a mill power a year.

Q. Have you made any computation, Mr. Main, as to what effect each day of restriction in excess of the twenty-three already alluded to has upon the value of the bonus? A. I have.

Q. And will you state what that is? A. \$469.

By the CHAIRMAN.

Q. That is, on each day? A. Each day.

By Mr. GREEN.

Q. How do you arrive at that amount? A. Each day of restriction increases the cost of steam power: coal, 200 horse power at 3.4 pounds per hour for 24 hours in a day, equals 7.29 tons, at \$4.05 a ton equals \$29.52; attendance, \$10; oil, waste, and supplies, \$1.92; care of ashes, 12 cents; total increase for each day, \$41.56. The total decrease for each day is as follows: 3.36 mill powers at \$5 equals \$16.80; attendance, 51 cents; oil, waste, and supplies, 80 cents; total decrease, \$18.11, making a net increase for each day of \$23.45, which, capitalized at 5 per cent., equals \$469.

Q. And these computations, as I understand, are figured on measured water? A. They are.

Mr. BROOKS. Mr. Green, is this a restriction on the entire power that he has figured?

Mr. GREEN. It is on the basis of the use which we have been discussing,—3.36 mill powers, is it not, Mr. Main?

The WITNESS. It is.

Q. Mr. Main, if we are to compare the cost of power at this plant, or the price to be paid for power at this plant, with 25 per cent. of the gross receipts, what elements are proper to be taken into account in making the comparison?

Mr. BROOKS. We object to the question.

The CHAIRMAN. We think that is competent. If we should undertake to do that ourselves,—we may not, but if we do, we want to know the way to do it.

Mr. BROOKS. We would like an exception to that.

The CHAIRMAN. All right.

The WITNESS. The elements which enter into the computation are, first, to obtain the cost of steam power, if this cost must be 25 per cent. of the gross receipts; and, after obtaining that, the other element which enters into the computation is to ascertain what could be paid for rental for water and bonus for water, the right to draw water and the land, so that this cost should just balance the amount which is equal to 25 per cent. of the gross receipts. There are one or two elements which enter into that computation which cannot be stated in a general way. For example, the 25 per cent. of the gross receipts, as I understand it, means the running expense of the steam plant, including the cost of coal, labor, and attendance; and to that should be added the interest on the cost of the land and the fixed charges on the cost of the steam plant.

By Mr. BROOKS.

Q. That is to be added to 25 per cent? A. Yes. This will give the sum total of the cost of the steam power, with which is to be compared the cost of the water power and supplementary steam power.

By Mr. GREEN.

Q. Now, if you will pardon me. As I understand it, to the 25 per cent. of \$56,600 you add something?

Mr. BROOKS. Wait a minute.

Q. You say something should be added? A. Yes.

Mr. BROOKS. We object to that question.

The CHAIRMAN. Point out the elements that enter into making up that, Mr. Main, if you haven't already.

The WITNESS. Into the 25 per cent. of the gross receipts enter these elements: the cost of coal, attendance, and supplies in running the steam plant. There should be added to this the interest on the land and the fixed charges on the steam plant, in order to get the total cost of the steam power, with which should be compared the total cost of the water power.

Q. Now, why should that be added? Why to the 25 per cent. of \$56,600 should be added interest on the cost of land and the fixed charges on the compound condensing plant?

Mr. BROOKS. We object to the question.

The CHAIRMAN. I can't understand the effect of it.

Mr. MATTHEWS. The witness has stated that a certain sum ought to be added to the 25 per cent.

The CHAIRMAN. And he has already stated what the elements are.

Mr. MATTHEWS. Why shouldn't they be taken into account?

The CHAIRMAN. Very well; unless you desire to discuss it, Mr. Brooks.

Mr. BROOKS. There is one objection to it, I presume, that is patent. They are assuming a certain sum of money. They are endeavoring to get in the figures of Mr. Prichard in this "whipping the devil round the stump" process.

The CHAIRMAN. We admit it, subject to your objection.

The WITNESS. As I understand it, the 25 per cent. of the gross receipts covers simply the running expense of the steam plant. It does not include the interest on the land going with the steam plant, or the fixed charges of the plant; and, therefore, I have added these items to the 25 per cent. of the gross receipts in order to get the total cost of the steam power, and this makes a figure which can be compared with the cost of the water power, into which enters also interest on the land and the fixed charges of the plant.

Q. Can you refer us to any schedule already put in, for handy reference when this comes to be argued, where the cost of producing water power and supplemental steam power at the present plant is set out?

The CHAIRMAN. That has been set out so many times, Mr. Green, and it is here on your schedule.

Mr. GREEN. We thought to save any possible question.

The WITNESS. On Schedule 16 is given the total cost of steam and water power, \$18,261.76.

Q. Schedule 16? A. Yes, sir.

Q. And can you refer us to a schedule which shows the

items of interest on land and fixed charges on compound condensing plant? A. I think there is no schedule which shows that same figure.

Q. Then can you tell us what those items are, what they amount to? A. The total is \$3,197.50. I think that I should add one more thing.

Q. Yes. A. In the 25 per cent. of the gross receipts there is included the cost of repairs on the steam plant.

By Mr. GOULDING.

Q. In the 25 per cent.? A. Yes, sir.

By Mr. BROOKS.

Q. Do you mean that is to be in addition to the 25 per cent.? A. No. It is included.

By Mr. GREEN.

Q. Now, having obtained the amount of 25 per cent. of the gross receipts, and the cost of producing water power and supplemental steam power, can you tell us in what way, having obtained those two results, we could find out the bonus for the land and privilege?

Mr. BROOKS. I will save an exception to that.

The CHAIRMAN. I think that is what has already been done, Mr. Green, but if you desire to put it in in another way, we will allow it.

Mr. MATTHEWS. He hasn't given the last stage of his reasoning.

The WITNESS. . From the cost of steam and water power is deducted the cost of producing steam power alone, giving a sum in favor of steam power. This sum is capitalized at 5 per cent., and the capitalized sum is deducted from \$72,000, which is the price for the bonus, which enters into the calculation, producing the cost of the water power.

Q. And supplemental steam power? A. And supplemental steam power. The net result is the value of the land and privilege.

Q. Will you tell us now what elements are proper to be taken into account in ascertaining the amount that could be

paid for power if the running expense of the plant were not to exceed 60 per cent. of the gross receipts?

By the CHAIRMAN.

Q. Mr. Witness, before you answer that question, don't you take the same identical things into consideration? A. No, sir; I have to take more.

Mr. GOULDING. We object to the question.

The CHAIRMAN. All right. Go ahead, Mr. Main.

Mr. BROOKS. And we save an exception.

The WITNESS. The first thing to be ascertained is the total expense of running the station, and that should be 60 per cent. of the gross receipts. Into this total expense enters the item of charge for water, also the charge for liability insurance, boiler insurance, legal expenses, and extra cost of running steam plant 630.6 hours instead of 120 hours, which extra cost includes coal, labor, oil, supplies, care of ashes, water, and depreciation on water power plant and steam power plant. From this sum should be deducted the rebates on water rents. Shall I give the number of days?

By Mr. GREEN.

Q. Yes. As I understand it, there are two assumptions here. Which assumption are you travelling on now? How many restricted days? A. 23. From this should be deducted the rebates on water rents for 23 days at \$40. The result of this addition and subtraction gives a sum which represents the total cost of running the station. This is in excess of 60 per cent. of the gross receipts, and in order to bring the expense of running down to 60 per cent. of the gross receipts, the water rentals must be reduced by this sum which is in excess of the 60 per cent. From this must be deducted the rental for 3.36 mill powers at \$1,500, which gives a sum which will be capitalized at 5 per cent. Then the interest on the existing steam and water power plant and the interest on the corresponding compound condensing plant should be compared to see what the difference is, and this difference should be applied by capitalizing it at 5 per cent., which gives a sum which must be deducted from the first capitalized sum, and the answer is the

value of the land and privilege if the rental is \$1,500 a mill power for water as used, if the expenses plus the cost of interest charges are not to exceed 60 per cent. of the gross income.

Q. I notice that you mention certain items of expense, liability insurance, boiler insurance, and so on, which you said were in addition to other expenses. Is there any place in the evidence that you can refer us to where the other expenses not specifically mentioned by you can be found? A. The other expenses are found in the testimony of W. H. Foster, Vol. I., page 220.

Q. Now is there any place where these expenses, liability insurance, boiler insurance, and other things specifically mentioned by you, can be found? A. I think not.

The CHAIRMAN. That is, that is on the Holyoke plant? Didn't Mr. Chase testify as to that?

Mr. BROOKS. Yes, sir.

Q. Is there any place in your schedule where these items are found? A. I have them all on Schedule 19.

Q. Well, that is not offered in evidence. A. No.

Q. Well, that being so, can you tell us, or are you able to tell us what the amount of liability insurance would be? A. I can.

Q. At Holyoke. What is it? A. \$281.58.

Q. Are you able to tell us the amount for boiler insurance for Holyoke? A. \$82.50.

Q. Have you an opinion as to the amount proper to be allowed for legal expenses? A. \$277.

Q. Have you computed —

Mr. GOULDING. I ask to have that answer stricken out, on the ground that this witness has no capacity to judge of such things as that.

The CHAIRMAN. Your witness Mr. Chase testified to \$260, Mr. Green. Now if you desire to raise a question on that you can. You can stand by that or you can raise a discussion on this witness; just as you please about that.

Q. How do you arrive at your result of \$277?

Mr. GOULDING. I ask that the answer be stricken out, if your Honor please.

Mr. BROOKS. Will you read that question? The question was well enough.

The CHAIRMAN. Do you think that you need to discuss this half an hour, Mr. Green?

Mr. GREEN. No, sir, I do not.

The CHAIRMAN. (Continuing.) When it has already been testified, and not contradicted, that the insurance was \$266 a year by your witness, Mr. Chase?

Mr. MATTHEWS. This is legal expenses.

The CHAIRMAN. Oh, this is legal expenses. Mr. Chase put that in. He took the average of the companies throughout the State.

Mr. MATTHEWS. We might not be willing to rest entirely on Mr. Chase's testimony. All that Mr. Chase did was to compute what ought to be paid for legal expenses according to the experience of the other companies in the State. I do not know how this witness, Mr. Main, has figured it out.

The CHAIRMAN. Let us find out, in the first place. Strike out for the time being his answer \$277, and then find out how Mr. Main undertook to arrive at the legal expenses.

By Mr. MATTHEWS.

Q. What is your answer to that question, Mr. Main? A. I do not think I did try to find; I took it from something that had been already given.

Q. You assumed it? A. I did.

The CHAIRMAN. Very well; then —

Mr. MATTHEWS. It may stand for what it is worth, then, as an assumption of the witness.

The CHAIRMAN. It is mere assumption, Mr. Goulding.

By Mr. GREEN.

Q. Have you computed the extra cost of running the steam plant 630.6 hours? A. I have.

Q. And what does that amount to? A. Coal, \$617.41; labor, \$230; oil, waste, and supplies, \$35; ashes, \$3.

By the CHAIRMAN.

Q. What do you mean by these extra hours, Mr. Main? A. Mr. S. P. Winchester testified that the station would have to

run five days by steam power. Now according to my understanding it would have to run a great many more days than that, and instead of 120 hours it would be obliged to run 630.6 hours, and the extra cost of so running would be included in the total expenses.

Mr. BROOKS. I do not understand how you get your 630 hours.

By Mr. GREEN.

Q. Will you tell Mr. Brooks how you get your 630.6 hours ; tell us all. A. That appears in Schedule 13.

Q. Schedule 13. A. The total horse power hours given in Schedule 13 is 129,778. If that is divided by 200 horse power it gives 648 hours. There is some little reduction from that for some reasons I do not remember now, making 630.6 hours as the total hours during which the steam plant must run.

Q. Did you state the item you allowed for ashes, — which you say should be allowed? A. \$3.

Q. And for oil, waste, and supplies? A. \$35.

Q. What is the item — what amount in Holyoke should be allowed for water? A. \$20.

Q. That is city water? A. City water.

Q. What is the proper allowance, in your opinion, for depreciation of water power plant? A. \$350.

Q. And the steam plant? A. \$840.

Q. Assuming the legal expenses \$277, have you computed the footing of these items specifically mentioned by you? That is, have you added them? A. I have.

Q. And what is the total, as you add them? A. The total is \$2,736.49.

Q. You said from that should be deducted the rebates on water rent. Explain the \$40. A. The \$40 is the rebate on 8 mill powers at \$1,500 a year a mill power, or \$12,000. That is the sum which is charged up in the total expenses for water. From that should be deducted the rebates for 23 days of restriction at the same rate, which is \$40 a day.

Q. Let me ask you this: In the expenses given by Mr. W. H. Foster in Vol. I., page 220, which you have used, how many mill powers of water are considered? A. 8 mill powers at \$1,500.

Q. So you treat 8 mill powers yourself. Then, as I understood you, the rebate for 23 days should be deducted from \$2,736.49? A. It should be.

Q. Then what do you do with the remainder, after subtracting this rebate from \$2,736.49? A. I add that to what is given as 60 per cent. of the gross income.

Q. Do you? A. No, I do not. I add that to the total expenses as given by W. H. Foster.

Q. In Vol. I., page 220? A. Yes.

Q. And then from the total of those two you said you subtracted or took something? A. I subtract from that sum 60 per cent. of the gross receipts.

Q. And the remainder given is what—or shows what, rather? A. Shows the excess of expenditures over 60 per cent. of the gross receipts.

Q. In order to bring the cost of the water rental down to 60 per cent. of the gross receipts?

Mr. GOULDING. This is the same thing that the Court had excluded. I don't know as it makes any difference—

The CHAIRMAN. No. They undertook to put it in explicit figures. Now they want to show these figures, which will be of assistance to us in the event of our determining that it is competent to use them.

Mr. BROOKS. It occurred to us that this is the very question you have ruled on.

The CHAIRMAN. They cannot furnish any schedules, or go into figures on this. They can show the element to which it leads up.

Mr. BROOKS. Of course, that is Mr. Goulding's objection—he is giving figures.

The CHAIRMAN. He has given some figures which he ought to. This \$2,000 is new figures, we ought to have it.

(The last question was read.)

A. Yes.

Q. Having obtained this difference, in what way must we proceed in order to affect the water rental so that it will not cost more than 60 per cent. of the receipts? A. The water rental must be reduced from—shall I give these figures?

The CHAIRMAN. No.

A. — must reduced by the sum of—

Q. By the difference, isn't it? A. Yes, of—

By the CHAIRMAN.

Q. Well, the difference between 60 per cent. and the cost, isn't it? A. Yes.

Q. What do you do with that? That is what he wants to know. A. Deduct that from the water rentals in order to bring the cost of running down to 60 per cent. of the receipts.

By Mr. GREEN.

Q. Now, as I understand, under this proposition water is being paid for measured at the rate of \$1,500 per mill power per annum? A. Up to the present time it has not.

Q. It has not? A. It has been considered as paid for, 8 mill powers at \$1,500 a year, less the rebates.

Q. In order to treat it from the standpoint of paying for water measured as used at the rate of \$1,500 per annum per mill power, what do you do or how should the computation be made? A. If water is paid for as used at the rate of \$1,500, it would cost \$5,040, which has been given many times before; and if this amount is deducted from the water rentals less the excess, there will be obtained a sum which, if capitalized, will represent the value of the privilege and land if the interest charges on both plants are the same.

Q. Then, as I understand, you find or you suggest that we find that amount capitalized? A. Find that amount capitalized.

Q. That difference capitalized. And your rate of capitalization that you suggest is 5 per cent., you say? A. 5 per cent.

Q. Then you take, you say, the interest on the existing steam and water plant? A. Yes, sir.

Q. Can you tell us where, in any of your schedules, we can find the amount or the value of the steam and water plant on which we are to compute the interest. If you cannot— A. I do not find that given by itself.

Mr. BROOKS. Schedule 2, I am told, Mr. Green, that appears.

Q. Can you tell us offhand what the value is on which the interest would be computed? A. \$112,910.

Q. And what interest rate do you take? A. 5 per cent.

Q. Now, can you tell us the cost of the compound condensing plant?

Mr. GOULDING. That is the compound condensing plant. That is already in.

Mr. GREEN. Yes, it is the one that is in.

Q. I think you may state the figure offhand. A. Well, that is Schedule 17. \$58,950.

Q. Do you use the same interest rate of 5 per cent.? A. 5 per cent.

Q. I understood you to say you found the difference in those interest charges? A. I did.

Q. I think the rest of that was fully explained. You capitalize that at the same rate, 5 per cent.? A. I do.

Q. And subtract that from the first amount capitalized? A. Yes.

Q. Will you tell us, Mr. Main, what elements you should take into consideration in order to get at a proper comparison of the cost of water power at Holyoke, or the price to be paid for water power at Holyoke, and the price paid for water power at Indian Orchard used by the United Electric Company at Springfield?

Mr. BROOKS. I object.

Mr. GOULDING. I understand that question was ruled out after deliberation.

The CHAIRMAN. We have undertaken to inform counsel — we went over this — that we believe we are capable of passing on this question without this evidence; and as to this evidence that has been going in for the last hour, we calculated every element you put in excepting some computations that this witness made amounting to about \$2,000. We have got the figures. We have got an engineer on board and he is prepared to do these things. Now, if from over anxiety you desire to run a long line with us, we should hesitate to exclude your pointing out the elements; but I think we can safely assure you that we can do it without it. There is a limit even in the

trial of this case. I am not lecturing on this matter. We want to get every particle of evidence that is possible; but we also want to assist counsel to this extent, that, where there is something in our minds that we think we are pretty safe on, there is no occasion to go forward. I am depending now largely, of course, upon Mr. Turner. We asked him last night about it, and he said he thought we could take care of these things. But, when you ask a question as to the elements, we may overlook something—that is true. You can discuss it. But here you reach a point where it is a comparison between one plant and another, and I think we won't take that testimony at present anyway, until we have had an opportunity to examine it.

Mr. MATTHEWS. We would like to put the thing in the same way—what elements—

The CHAIRMAN. You can state in three words what you expect to show by this witness upon this point. Now if you will point out the elements yourself that you expect this witness to testify to, we will be obliged to you,—you and Mr. Green.

Mr. GOULDING. There is a deeper objection than all that. When he talks about the elements that have got to be taken into account in order to determine whether the cost of power at Holyoke would be more than 25 per cent., and gross expense more than 60 per cent., it is an entirely different thing from asking him what elements he has got to take into account in order to find out how the cost of power at Holyoke would compare with the cost of power at Indian Orchard. It is an entirely different thing. I submit that the cost of power at Indian Orchard—the elements of cost—are not competent evidence. I know it is true that Mr. Anderson did in direct examination answer a question as to what their power cost them per mill power. If it had been objected to I don't know on what ground it was competent. It certainly is not competent to go into the question of the elements that you have got to take into account in order to compare the cost at Holyoke with the cost at Indian Orchard. Cost, as distinguished from a sale of power, I submit is not competent at all; and *a fortiori* it is not competent to go into a computation on account of the

elements which you have got to use to ascertain the cost at Holyoke as compared with the cost at Indian Orchard or Hartford.

Mr. MATTHEWS. I think Mr. Goulding misstates again, as he did yesterday, or as it seemed to me he did yesterday, our use of the word "cost." That word is, perhaps, ambiguous. We do not mean, however, in this connection to use the word "cost" as synonymous with cost of production, Mr. Green yesterday, and I also, used the word simply as the equivalent of the price paid.

Mr. GOULDING. There was no evidence of price paid.

Mr. MATTHEWS. I beg pardon, it is in.

Mr. GOULDING. I beg your pardon; what it would cost is in.

Mr. MATTHEWS. And then on cross examination we got out the price.

Mr. GOULDING. I do not understand there was any evidence of the price paid for power at the Springfield station. There was evidence of what it cost them.

Mr. MATTHEWS. Oh, no.

The CHAIRMAN. You offered that evidence.

Mr. GOULDING. It was what it cost at the station.

The CHAIRMAN. I supposed that evidence was offered as bearing on the value of the water power at Holyoke; otherwise it wouldn't have been offered. The witness testifies to a certain amount.

Mr. MATTHEWS. I do not understand what Mr. Goulding means. Mr. Anderson testified to the exact amount paid in cash by one corporation to the other annually. It was \$8,100. Now the reason we want expert assistance in making the application to Holyoke is that it is not at all apparent just what elements must be taken into account in making the application. For instance, Mr. Anderson made it one way. Mr. Main might make it an entirely different way. I might make it in a third way, and Mr. Green in a fourth, and each one of the Commissioners might have his own theory. It seems to me that either side is entitled to expert evidence as to how the comparison should be made and as to the proper elements to be taken

into account. And while we have great confidence in the ability of a commission composed as this is to figure out a comparison of this sort, still it is not fair to us that it should be done after all the evidence is in, we remaining in ignorance even at the final argument as to the manner in which it is to be done. Whereas, if we are permitted to show our theory of how it ought to be done, and the same privilege is extended to the other side, as has already been done, then we have two alternative theories of computation, which we can respectively argue out to the Commission. Then after that, if the Commissioners in their discussions see fit to apply a method of their own, that is a matter neither here nor there, I suppose; but it seems to me we are entitled to some expert explanation of the elements which should be taken into account. I do not see any difference between this question and the other two that have gone in.

Mr. GREEN. It seems to me, if your Honors pass upon the question last raised by Mr. Goulding, which of course goes to the essence of it, possibly we could shorten this case between us. I doubt if Mr. Goulding was satisfied that the evidence in itself was admissible, that there would be any serious objection to putting it in in schedule form. It would be very short.

Mr. BROOKS. I would desire to make this suggestion. What familiarity has Mr. Main shown with the situation at Indian Orchard? Isn't that one of the necessities that it is requisite for them to show before they can put in how he would figure the elements? He knows nothing about this power at Indian Orchard, knows nothing about the situation there, so far as his testimony discloses. It seems to me that ought to exclude it.

The CHAIRMAN. If the petitioners are going to argue that this property is worth more than \$1,500 on account of the fact that they are paying \$2,300 over at Springfield, I think the defendants certainly ought to be allowed to weaken that testimony if they can — if you are going to depend upon that as a factor of the valuation of rental.

Mr. GOULDING. I should like to understand, if I can,

how this series of questions, the first of which is propounded and the following are intended to succeed, differs from the question that was raised last night and adjudicated by the Commission. Simply because they use the word "element," what has that to do with it? The objection was to comparing the cost under these rentals at Holyoke with the cost at Springfield. Now my friend says that in cross examination Mr. Anderson gave what they paid in cash at the forebay at Indian Orchard, wasn't it? What has that to do with the power at Springfield transmitted by electricity? It is merely one element. You might say they paid the man that wheeled a wheelbarrow to build the dam or did the excavation for the dynamo at Indian Orchard so much money.

The CHAIRMAN. Well, Mr. Green, you can go forward and ask these questions. We will determine after hearing the evidence whether we can make any use of it or not, inasmuch as no figures are given, and he will simply give the outlines of the method which he would employ in taking this evidence. We understand Mr. Brooks is entirely correct, that he himself does not understand it — he has not visited it.

Mr. GREEN. Oh, I don't say that. We have not asked that.

The CHAIRMAN. As I understand, this witness is going to do this for us now: he is going to give us the method of taking that testimony, the elements that enter into his mind as to the best method of treating that. Mr. Cotter does not think it is admissible as much as I do. I would not like to make a wager on this proposition, but I will venture that, after this witness has made his statement, if any one reads Mr. Matthews's cross examination of this man, there won't be a single thing said by this witness that Mr. Matthews has not already opened up in his cross examination.

Mr. MATTHEWS. If your Honor please, that last statement leads me to ask the privilege to say just a few words, which may throw some light upon the problem that your Honors are now discussing. The cross examination of Mr. Anderson was based, of course, upon his statement in direct that \$2,375.87, as stated by him on page 233 of his direct examination in Vol.

V., was the "equivalent" of the price paid by the United Electric Light Company of Springfield. Now on cross examination what I thought I did was to get at the exact facts, to make him give that calculation in detail, and to prove that it was entirely erroneous; that the real equivalent paid in Springfield for comparison with Holyoke was about \$600 a mill power instead of \$2,375. Now that is as far as I got, as a lawyer, with it. I am free to say that I do not think it was worked out in cross examination as a water engineer would do it, and it seems to me we are entitled to have an opinion by our experts to meet the opinion of Mr. Anderson; so that when the attorneys for the Company at the close of this case argue to your Honors that \$1,500 a mill power is a low price in Holyoke, because only a few miles off at Springfield the electric light company is paying \$2,375.87 per annum per mill power, it will be open to us to argue that \$1,500 a mill power in Holyoke is a high price, because the United Electric Light Company is only paying \$300 or \$400 a mill power for similar water. We ought not, it seems to me, to be confined to the arguments of counsel on the matter; we ought to have the assistance of an expert in that investigation.

Mr. BROOKS. Of course, your Honors, if this is admitted, will take into consideration that it is not water similar to the water that is offered here by this lease. Mr. Anderson says in substance in his testimony that their water is freshet water, corresponding to the so called surplus surplus, or the ordinary surplus at Holyoke.

The CHAIRMAN. Don't you depend on that statement, that the value of water in Springfield is a criterion?

Mr. BROOKS. I don't say whether we do or not. We will if we can.

Mr. MATTHEWS. That is what I thought.

Mr. BROOKS. But that is not the point to which I am addressing myself. It is an entirely different class of water. He is paying a certain price for the surplus surplus that is sold in Holyoke and measured; it is nothing but freshet water.

Mr. MATTHEWS. That makes your argument all the stronger if the facts are so.

Mr. BROOKS. I think so. I think it does make it stronger.

The CHAIRMAN. What is the question that we are discussing?

Mr. MATTHEWS. The question is, What are the elements that should be taken into account in making the comparison?

Mr. GOULDING. If that isn't the question that your Honors settled last night, then I don't know.

Mr. MATTHEWS. I understand the Commissioners said we couldn't put in that testimony by schedules, but we could ask the witness to explain his method, and Mr. Green in his questions to-day has religiously confined himself to that.

Mr. GOULDING. If that is all there is to it, that wasn't enough to vindicate any discussion at all. What do we care about schedules or whether it is taken down in shorthand? What do we care? That isn't what we were debating yesterday. It was the question of the competency of the evidence itself, whether in the form of a schedule or an oral statement or whatever shape it took, and we objected to it in substance. Now the question they ask has nothing whatever to do with the question of whether Mr. Anderson put on an exaggerated estimate or didn't. If they have shown, as they say, that Anderson is not paying but \$600 a mill power, what is the trouble? Now they ask, What are the elements to be taken into account by way of comparison? In the first place, the comparison is not competent. As your Honor stated very well this morning, the fact of a sale—and it may be the fact of an elaborate cost, but at any rate the fact of a sale in another town of similar property ends the evidence, and you cannot call an expert and ask what elements are to be taken into account in comparing that sale in Springfield with the property we are valuing in Holyoke. Take the simplest case, the value of a piece of land, where evidence is offered of the sale of another piece of land similarly situated. You cannot call an expert and ask him what are the elements to be taken into account in comparing that sale, which is competent evidence, and that is all there is to it. Well, this is property we are valuing, and this is absolutely nothing else whatever

except to get an expert to come in and undertake to tell what the elements are that you must take into account in comparing a sale of another piece of property with the property to be valued. You are entering on an unknown sea, where there is no chart to sail by.

The CHAIRMAN. Now let me say here on the question of similarity and dissimilarity that certain evidence, not this evidence, may be competent, as it always is, but beyond that I do not see how you can go. I do not see that it has the slightest use. Just think of it. By the way, we are using up the day in discussing a question that I wonder whether it will have any final influence on the case. I am trying with you the valuation of a piece of land in the market. That is all we are doing here. You produce a dozen sales which you claim in that neighborhood—which you claim to be similar in character,—one property worth \$50,000, one \$40,000, one \$20,000. Now I come in and say, "Well, there is a dissimilarity between the two, they are not alike; and here is evidence of their dissimilarity." Certainly I have a right to do that. But when you undertake to ask this question, "This property sells for \$50,000 over here. How much should this property on that account be worth over there—the property that we are valuing?" I do not believe that is competent. I do not believe any court ever admitted it; and this is where your evidence is all tending to, excepting on the question of similarity and dissimilarity. What do we care about the Springfield valuation excepting so far as it bears on the question of similarity?

Mr. MATTHEWS. That is substantially the same thing, I take it.

The CHAIRMAN. I don't think it is substantially the same thing.

Mr. MATTHEWS. We ask the witness to point out the elements that enter into a proper comparison, and those elements evidently depend upon the similarity or dissimilarity of the two cases.

Mr. GOULDING. It is for the Court to decide whether properties are similar.

Mr. MATTHEWS. Taking up Mr. Goulding's illustration, we can stand on it.

The CHAIRMAN. Yes, we think it is for the Court to decide whether they are similar or dissimilar.

Mr. MATTHEWS. After hearing the evidence.

Mr. GOULDING. Do you claim that your present witness undertakes to testify as to the similarity between the two?

Mr. MATTHEWS. Excuse me a moment. If you will let me finish my statement, I was just going to cover that very point. Mr. Goulding states that in a land case we could not go into the facts as to the situation of the property. We can where witnesses on the other side have testified to a similarity. That is all we are proposing to do here, in substance,—to show in what respects the water power in Springfield, which they by their own testimony have likened to the water power in Holyoke, is similar or dissimilar. Mr. Anderson has stated that it is similar in some respects and dissimilar in some others.

The CHAIRMAN. I do not think he has.

Mr. MATTHEWS. I beg your Honor's pardon, I will read what he says. I would like to read the last question and answer of Mr. Brooks's direct examination, on page 234.

"Q. And does the water that you pay for correspond with the surplus power in Holyoke, the last kind of water power?"

By this Mr. Brooks means the surplus surplus, and the answer is "Yes, sir." Now we have a right to meet that.

The CHAIRMAN. Well, we will shorten this discussion by having this witness testify as to whether he can point out any similarity or dissimilarity between the Holyoke water power as power and this power at Indian Orchard.

Mr. BROOKS. If I may be permitted to say just a word in connection with this, in reply to my friends. My point was, if I had any, that the water power at Indian Orchard for which a certain sum of money was paid by the Springfield United Electric Light Company was a power worse in its nature than the power that we offer here; that it was so called surplus surplus.

Mr. MATTHEWS. Consequently the argument is all the stronger.

Mr. BROOKS. I say it is an entirely dissimilar power.

The CHAIRMAN. Well, the discussion is ended. Now, Mr. Witness, you may confine yourself to pointing out any similarity or dissimilarity, so far as you can determine from the evidence, between the Holyoke water power and this power.

Mr. MATTHEWS. Here is a fundamental question, which Mr. Anderson was asked upon direct examination, and upon his answer to which Mr. Brooks says he is going to rely in final argument.

The CHAIRMAN. What is it?

Mr. MATTHEWS. It is that the water power cost the United Electric Light Company \$2,375. Now, cannot we meet that? It seems to me unnecessary to argue it. We say that is not right; that he multiplied by five or six or seven the comparative cost of the water power that the United Electric Light Company gets at Indian Orchard.

The CHAIRMAN. Isn't that embodied in your cross examination?

Mr. MATTHEWS. To some extent; but, where the other side has testified to a fact or opinion, we have the right to meet that fact or opinion by our own witnesses, and we are not confined, it seems to me, to cross examination merely. Cross examination is a useful weapon doubtless, but it is not nearly so effective, as a rule, as putting in the evidence of your own witnesses. Cross examination has its limits. Witnesses may not be honest, they may not be straightforward, they may not be willing to tell the whole truth, and all we can get out of them in cross examination may be a part of the truth, a significant part, but not the whole. It may be, as in this case of Mr. Anderson, utterly destructive of his testimony in chief; but, on the other hand, his admissions may not have gone to the full reality of the situation, and that we expect to show from this witness.

Mr. GOULDING. We do not object to any question to Mr. Main as to any calculations of Mr. Anderson's, if he has got any. That is not the question that is asked here. It is, What elements are to be taken into account to compare the works up there with these works down here? Now, if he has got any calculations relating to Mr. Anderson's statement that

their power cost them \$2,300 a mill power, we have no objection to it.

Mr. GREEN. I think we will get onto common ground at once, then.

Mr. GOULDING. You will have to ask some question of an entirely different nature from what you have yet, then.

Mr. GREEN. That may be.

The CHAIRMAN. Put your question.

Q. Mr. Main, have you made any calculations to ascertain, on the basis of Mr. Anderson's figures, the cost of the water power at Springfield to the United Electric Light Company?

Mr. BROOKS. He can answer that yes or no, I suppose?

A. I have.

Q. Are they in the form of a schedule? A. They are.

Q. Now have you the schedule here?

The CHAIRMAN. If it is admissible, Mr. Brooks, you do not object to the schedule, I suppose?

Mr. BROOKS. We would like to see it.

Mr. GREEN. I was just going to offer it to you.

Mr. BROOKS. Well, we object to this schedule.

Mr. GOULDING. This is nothing of the kind. It is a calculation of the comparison of the expense at Holyoke; and, when the witness says he has made any calculation as such, he simply doesn't understand the question or doesn't care how he answers.

The CHAIRMAN. Gentlemen, let us get down to a practical question here. We have been standing still here for some little time.

Mr. GOULDING. This is nothing but a comparison of the same thing that they have been trying to get in.

The CHAIRMAN. I understand. Never mind about that question. It is competent for you to call this witness's attention and have him point out any errors of computation made by Mr. Anderson with reference to the Springfield water power plant.

Mr. MATTHEWS. On direct or cross.

The CHAIRMAN. On direct or cross. Go ahead on that.

Mr. MATTHEWS. I think the witness looked at the wrong paper. Turn to the third page.

The WITNESS. There are only two pages in this schedule.

Q. Then, from anything you have got, will you state it orally? Won't you look at page 48? A. I have that.

Q. Now if you will go ahead and state it orally.

Mr. BROOKS. State what?

Q. You said you had made certain calculations to ascertain the cost of the water power at Springfield. A. I have made some calculations.

Q. Will you give us those calculations? A. Mr. Anderson testified, Vol. V., page 263, that the capacity of the wheels at Indian Orchard was 2,700 horse power. On page 291, that this power was used at the peak of the load. Pages 223 and 269, that the average power developed is $13\frac{1}{2}$ mill powers. On page 370, $13\frac{1}{2}$ mill powers at 65 horse power equals \$77 horse power for 24 hours a day and 365 days a year. On page 284, price paid for water \$600 a mill power, or \$9.23 a horse power a year at Indian Orchard. Page 285, quantity determined by gate opening. Page 286, total amount paid for water about \$8,100. Page 295, cost per mill power delivered at Springfield is given as \$2,375.85, which was afterwards corrected to \$2,048.72. Page 369, this was afterwards increased by another calculation to \$2,617 per mill power delivered at Springfield, which Mr. Anderson says is comparable with the \$1,500 per mill power at Holyoke.

Mr. BROOKS. Now we object to that.

Mr. GOULDING. We ask to have that stricken out, the last part of it.

The CHAIRMAN. Go ahead and finish up your answer.

The WITNESS. $13\frac{1}{2}$ mill powers at 65 horse power equals 877 horse power at Indian Orchard, and with 25 per cent. loss equals 10.1 mill powers, or 661 horse power delivered at Springfield. The total cost and extra cost of power delivered equals \$2,617 per mill power delivered, or \$26,431.70 total, for 661 horse power, which is equal to nearly \$40 a horse power. That is the calculation that I have made, to get the cost at Springfield.

Mr. GOULDING. I want to enter at this point an objection. That is, that this witness is evidently reading from a

paper which he has prepared, which paper is a comparison of the water privilege at Holyoke with the water power at Indian Orchard used by the United Electric Company of Springfield. That paper he is reading up to the present time, word for word. I understand the Court have already said that such a comparison could not be entered into.

Mr. GREEN. All that he has said so far is preliminary. He has not read any comparison yet; he has only stated the computations of Mr. Anderson's own testimony.

Mr. BROOKS. He has read one comparison already.

Mr. GREEN. Has he?

The CHAIRMAN. Well, we note your objection, gentlemen.

Q. Have you made any —

Mr. BROOKS. I ask to have his other answer stricken out.

The CHAIRMAN. We reserve that question, Mr. Brooks, at present. Of course, so far, any man can pick up the evidence and do exactly what the witness has done.

Mr. MATTHEWS. How is he going to do it? How is he going to do it right?

The CHAIRMAN. Because it is presumed that we shall read the evidence. How do you know that we shall ever look at the evidence after we get through?

Mr. MATTHEWS. For that reason we want you to hear it.

Mr. GOULDING. What I object to is this indirect way of attempting to do things. A man might just as well get up and read the parable of the Prodigal Son until he starts back from his debaucheries, and then stop and say that he was not reading from the parable of the Prodigal Son at all. We see what he is reading from, and he knows what he is reading from. Now we want to object to the parable of the Prodigal Son at this point.

The CHAIRMAN. We understand the objection. Your next question, Mr. Green?

Mr. MATTHEWS. If your Honors please, if Brother Goulding insists on his objection on the ground that he has stated, I think we shall be compelled to ask the witness to state his testimony orally, without referring to his manuscript.

The CHAIRMAN. Any expert can refer to manuscript.

Mr. MATTHEWS. I understand he can refer to it, but I do not understand he can read verbatim. I do not think we should be quite safe to leave it that way.

The CHAIRMAN. Oh, every expert can do it. We rule it is competent for that purpose.

Mr. GOULDING. My brother Brooks wants to add that he is reading from the parable of the Prodigal Son and pretending that he is reading from the Arabian Nights.

By Mr. GREEN.

Q. In your opinion, is the \$2,048.70 or \$2,617 a mill power, as stated by Mr. Anderson, comparable with the \$1,500 asked at Holyoke?

Mr. GOULDING. I object.

Mr. BROOKS. Well, wait a minute. I thought we had got that passed on, anyway.

Mr. MATTHEWS. That is the whole point.

The CHAIRMAN. I think that is competent. What do you say, Mr. Cotter? (Conferring with Mr. Cotter.) I have changed my mind: I think it is not competent. Excluded. Go on, if you please, save your exceptions.

Mr. MATTHEWS. Why, if your Honor please, I thought your Honor asked Mr. Brooks if he was going to rely —

The CHAIRMAN. You understand my position absolutely.

Mr. MATTHEWS. I do not, sir; I do not.

The CHAIRMAN. Then I will undertake to explain it. Mr. Anderson testified to certain things. Now you can call this witness's attention to any errors, mistakes in calculations or computations, as bearing on that question. The question just put meets the conclusion of that; but, having been objected to, you have got to go into the elements of it. This witness is here to testify, as I understand, that Mr. Anderson in some way made a mistake in his computations. I wish personally that this thing could be gotten over the ground, because I think we ought to reach a point where we can start.

Mr. MATTHEWS. Mr. Brooks stated to your Honor, in answer to your Honor's point blank question whether he in-

tended to rely on Mr. Anderson's statement on page 233, that he might.

The CHAIRMAN. Mr. Matthews, I can help you by pointing out to you that it is not competent on questions of valuation of real estate to call a witness and ask his opinion as to another piece of land as comparable.

Mr. MATTHEWS. When the other side has put it in?

The CHAIRMAN. When the other side has used that very thing, yes.

Mr. MATTHEWS. If the other side, for instance, put in the price of a parcel of real estate for the purpose of showing the value of the real estate that is being litigated, it is certainly competent, either in cross-examination or by the direct testimony of witnesses on the other side, to show dissimilarity in condition.

The CHAIRMAN. Certainly, dissimilarity, but not by asking them whether it is comparable.

Mr. MATTHEWS. We were going on to do that, and Mr. Goulding said he had no objection to our pointing out wherein Mr. Anderson's calculations were erroneous.

Mr. BROOKS. As to the cost of power here at the Springfield station. I do not understand that you went any further than that.

Mr. GOULDING. Of course.

Mr. MATTHEWS. Now the point is this —

The CHAIRMAN. Mr. Matthews, we shall never get on unless you take the direction of this Court in something.

Mr. MATTHEWS. Exactly, sir; but it seems to me, with all deference, that the Court is shutting us out of a most important part of our case.

The CHAIRMAN. We do not think so.

Mr. MATTHEWS. Well, sir, we do; and are not we the judges of it, at least to the extent of being entitled to a hearing? Your Honor asked counsel for the Water Power Company if they intended to argue that this water power at Springfield cost the United Electric Light Company \$2,375.87, and that, inasmuch as the Holyoke Water Power Company only asked \$1,500, the latter price was extremely low and reasonable.

Now, cannot we meet that by showing that this opinion of Mr. Anderson's was entirely erroneous?

The CHAIRMAN. Yes.

Mr. MATTHEWS. That is all we are trying to do.

The CHAIRMAN. Your question is as to whether it was comparable.

Mr. MATTHEWS. Because Mr. Anderson compared it, if your Honor please. If you read pages 233 and 234, your Honors will see that the whole object of this figure given by Mr. Anderson of \$2,375.87 was for the purpose of comparing it with the \$1,500 asked by the Holyoke Water Power Company.

The CHAIRMAN. Read the whole evidence, then, if you will.

Mr. MATTHEWS. I should have to read the whole of Mr. Anderson's, I think. It is not very long. I will do it; but I should like to finish my sentence, however. It is very plain, according to Mr. Brooks's statement, that that is going to be their line of argument. Now, if your Honor wishes me to read the evidence, I will refer first to—

The CHAIRMAN. Let me make this suggestion, Mr. Matthews; perhaps I might help you. Ask the witness if he has read over Mr. Anderson's testimony, and if, in so doing, he has discovered any errors of computation, calculation, or confusion.

Mr. MATTHEWS. Or comparison.

The CHAIRMAN. No. Let us go three things at a time—if so, point them out. Then we can make the comparison ourselves. But let us do that thing first.

(Mr. Green asked the stenographer to read the chairman's suggestion as to the form of the question, which was done.)

By Mr. GREEN.

Q. You heard that statement; I will ask you that as a question.

Mr. BROOKS. Wait a moment. We object to that, your Honor.

The CHAIRMAN. Now, gentlemen, we have heard you discuss this subject; and don't you really think there is an end of discussion on these questions of evidence?

Mr. BROOKS. Well, I don't know; I don't know. There doesn't seem to be. Now, I do not object to this question on two phases of it; but the conclusions—for him to point out mistakes in conclusions—we do object to it.

The CHAIRMAN. All right.

Mr. BROOKS. It is simply calling for an argument from the witness. Any mistakes in calculation—

The CHAIRMAN. In my view of it the question is competent. It is my own question, and I am disposed to stand by it. Mr. Cotter thinks it ought to be limited; I don't.

Mr. BROOKS. I have never yet known that a witness was allowed to point out mistakes in conclusions of other witnesses. I think the counsel can do that when they come to make their argument. If that is so, then you have a right to have an argument from every witness. But any calculations that Mr. Anderson made, if there has been any mistake in them, I think he is right—

Mr. GREEN. I have adopted the suggestion of the Court.

The CHAIRMAN. Mr. Cotter thinks that question is too broad. Confine yourself, in the first instance, Mr. Green, to the first two elements in the question, if you desire to.

Mr. GREEN. I shall have to ask the stenographer to give me them in their order, so that I shall be sure to get the right ones.

(The stenographer stated that the first two elements were "any errors of computation or calculation.")

The CHAIRMAN. All right, go ahead on that.

Q. Have you discovered any errors in computation and calculation? A. I have discovered no errors in the computation and calculation of Mr. Anderson of the cost of power delivered to the Springfield station. There is an error—

Mr. BROOKS. Wait a minute.

Q. Go ahead. A. —in the amount of \$1,500 per mill power, which he states is the cost of power at Holyoke.

Q. You mean on the same basis? A. On the same basis.

Mr. GOULDING. That is the comparison that has been excluded. It seems to me we are entitled to—

The WITNESS. Or on any basis.

The CHAIRMAN. The witness has answered that question. Now put him another one, Mr. Green.

Q. What is that error? In what does it consist?

Mr. BROOKS. That we object to.

The CHAIRMAN. Admitted.

Mr. BROOKS. We will save an exception.

Mr. GOULDING. You go back on the whole ruling, as I understand it.

The CHAIRMAN. Perhaps we do. We are going to admit that question.

Mr. GOULDING. I will except.

A. There are other items which enter into the cost of the power at Holyoke than the \$1,500.

Mr. GOULDING. I ask that the answer be excluded.

The CHAIRMAN. Why? Isn't it pertinent to the—

Mr. GOULDING. Because, may it please your Honor, we are here about a serious business, and not as boys, and that comparison has been excluded by this Court over and over again; and now, by this little transparent performance of shifting the question, it is proposed to get it in. I appeal to the dignity of the lawyers on this Commission and to the dignity of all three of the Commissioners on this question.

Mr. MATTHEWS. If your Honors please—

The CHAIRMAN. We think the evidence is competent. Go ahead, Mr. Green.

Q. Proceed, Mr. Main.

Mr. BROOKS. We want to take an exception to all this line of inquiry, and save interruption.

A. To the interest on the bonus for land and privilege, amounting to \$225, there should be added labor, amounting to \$159.69, fixed charges, amounting to \$218.28, and maintenance, amounting to \$87.31, making the total cost per maximum mill power at Holyoke \$2,190.28.

By Mr. GREEN.

Q. Why do you say those should be added?

Mr. GOULDING. I object, your Honors. The witness is reading from a paper which is entitled "Value of Water Power Privilege at Holyoke in Comparison with Power at Indian

Orchard used by the United Electric Company of Springfield." On the second page of that paper he is reading from a comparison which has been excluded. The paper has been excluded. This Court adjourned once on account of this paper particularly.

Mr. GREEN. All I am asking the witness to do is to give these certain results. I assume he can use this paper to refresh his recollection.

The CHAIRMAN. I don't know of any rule to follow if he cannot.

Mr. GREEN. He is simply picking out certain figures.

Mr. GOULDING. I aver that he has testified to nothing in answer to these questions except to read from this paper.

The CHAIRMAN. Is there any other rule you can follow in these hearings?

Mr. GOULDING. Yes; there is the rule of evidence, which this Commission are acquainted with, and I appeal to their knowledge of evidence. That is all.

The CHAIRMAN. Let us go forward at least regularly. In these long cases I have never known instances where an expert has not been allowed to read from his memorandum prepared for that purpose. I don't know about the regularity or irregularity, but it would become an interminable thing if a witness couldn't be allowed to do that. I know my attention was once called to it by Mr. Pillsbury, who insisted that a witness could not use memoranda, and put a witness on subsequently who read from memoranda for three or four days. I don't quite see how we can go ahead without it.

Mr. GOULDING. The history of this case for the past three or four hours, including yesterday afternoon, is not unknown to this Commission, and I submit that a paper was offered here, and evidence was offered from that paper, and that evidence was excluded. And now, by simply changing the question, the witness is allowed to read from that paper. He hasn't done anything else.

The CHAIRMAN. Let us understand this. After this I don't propose to go into the matter again. At the last hearing before this Commission in Boston, the schedule of this witness was offered with other schedules, and no objection was made.

There was an objection to this schedule because it contained a lot of literature that ought not naturally to run with the schedule. It was excluded on that account. I suppose the rule, if strictly applied, is that every expert can only look at a memorandum to refresh his memory, that he can't read from it, or bring the document into court, strictly speaking. That is the old-fashioned notion; but with these new-fashioned ideas, where there is so much extraordinary literature prepared, I don't quite see how an expert is going to get along without it. But, if Mr. Goulding raises that question, I shall ask the witness to refresh his memory. As far as this question is concerned, it strikes me, if the petitioner is going to rely upon its evidence of what at Springfield is applicable to the value of water power at Holyoke, personally I see no reason why this witness should not be allowed to state certain items, either by figures or otherwise, that enter into the making up of a horse power besides the \$1,500. That is my view. That is all I understand this witness does.

Mr. MATTHEWS. Your Honor asked me, a moment ago, if I could refer to the evidence of Mr. Anderson in detail, upon which we rely to secure the admission of Mr. Main's evidence. This might be a convenient time for me to answer that question.

Mr. BROOKS. The Court has ruled it in.

By Mr. GREEN.

Q. Why are the items to be added? A. Those are to be added to the \$1,500 in order to get the total cost for maximum mill power at Holyoke.

Q. Whether or not, to put it the other way, the amount of similar items is found in the \$2,048.70?

Mr. BROOKS. Wait a minute. I object to that, to remain consistent.

Mr. GREEN. Very well. I will withdraw the question. I believe it shows in the record the things contained in the \$2,048.70. I withdraw the question.

Q. If the \$2,048.70 given by Mr. Anderson is not comparable with the sum of \$1,500 paid or asked at Holyoke, with what sum paid at Holyoke would it be comparable?

Mr. BROOKS. That, we thought, had been passed on.

Mr. MATTHEWS. If the Court please, I wish to be heard on that. That, I understand, is the same question which has already been put, only with reference to average instead of maximum power. We think this case should be tried on the theory of the actual or average amount of power required to run this plant, and not on the theory of the maximum amount of power required to run this plant at the peak of the load. I think, at this time, I should like to reply to your Honor's question, and state the importance of Mr. Anderson's evidence from the standpoint of the Company, and the importance of our being permitted to make a reply, and to put the calculation just as Mr. Anderson did, only to put it right. On page 228 of Mr. Anderson's direct examination I find these questions and answers:—

"Q. From whom do you obtain your water power? A. From the Indian Orchard Company.

"Q. And what is this water power? What kind of water power is it that you obtain? A. I don't quite understand.

"Q. To what class of water power in Holyoke does your water power correspond? A. It corresponds to surplus surplus."

On page 229.

"Q. I see in your schedule you have put in the land with the water privilege at \$72,000? A. Yes, sir.

"Q. What does that comprehend? A. That comprehends the land upon which the electric light plant is placed and the privilege of drawing and using on that land 16 mill powers of water from the canal.

"Q. At how much rental? A. At a rental of \$1,500 per annum."

On page 231 is another statement by the witness of his value of this water privilege of \$72,000 and water rent at the fixed sum of \$1,500 per mill power. Then, at the bottom of page 233, comes this question, after several questions and answers relating to the mode of transmitting power from the dam at Indian Orchard to the electric light station in Springfield. Mr. Brooks asks:—

"Q. On the theory of rentals, Mr. Anderson, how much does your water power cost you per mill power per annum in the city of Springfield, delivered on your shaft? A. It is the equivalent of \$2,375.87 per mill power."

Then, immediately following is this : —

"Q. And take that price, assuming that steam power is equal to water power in efficiency, which is the cheaper? A. The water power.

"Q. Is that something you know by investigation? A. Yes. Every record that we have indicates that the water power is more economical to use than to operate a steam plant for the same work.

"Q. At this expense of twenty-three hundred and some odd dollars per annum? A. Yes, sir."

Then : —

"Q. Is there any difference in the cost of steam between Springfield and Holyoke? A. In the cost of producing steam for carrying on a central station for an electrical lighting business there should not be any great difference. There may be a difference in the slight increase of the cost of coal.

"Q. You mean by freight? A. Yes, sir.

"Q. An increase at Holyoke? A. Yes, sir. Coal might cost a trifle more there, on account of freight, than it does in Springfield.

"Q. And does the water that you pay for correspond with the surplus power in Holyoke, the last kind of water power? A. Yes, sir."

Now, there is the theory of the Company, developed in the direct examination of Mr. Anderson, that it is proper to compare the \$1,500 a year which the Company wants us to pay for water power at Holyoke with the \$2,375.87 which Mr. Anderson figures out on page 233 to be the cost of the power used and hired by the United Electric Light Company of Springfield of the Indian Orchard Water Power Company. Afterwards Mr. Anderson desired to correct those figures. In the first place, on cross examination, on page 382, he was led to say that the figure of \$2,375.87 should be corrected to \$2,048.72, but at another point, on page 369, he stated the figure to be \$2,617; and that we understand to be what my brothers upon the other side will argue is the price in Springfield for water power which

is comparable with the \$1,500 a year asked in Holyoke. And the argument that they will make from that opinion of Mr. Anderson's is very plain. It was elicited by the Chairman of the Commission from Mr. Brooks this morning, and it is a strong argument. It is a strong argument, if Mr. Anderson's computations are correct. We haven't here the advantage of actual sales, actual leases. We have got to value this power in the best way we can, and this experience of the United Electric Light Company of Springfield was evidently considered by my brothers on the other side to be valuable experience, and to be a factor which would tend to assist the Commission in fixing the value of water power in Holyoke. And we think so, too. We differ with our brothers simply in this : we assert that Mr. Anderson has made a fatal miscalculation, to expose which an attempt was made in cross examination along one line of thought, and to expose which we insist upon our right to introduce the opposite or conflicting opinion of an expert on our own behalf. We want to have this witness testify, if it be a fact, that he has made an examination of the water power of Springfield and Indian Orchard, that he has familiarized himself with the facts of the case, such as he could glean from personal examination or investigation and from the statements of Mr. Anderson, and that it is his opinion that the figure with which to compare Mr. Anderson's \$2,617 or \$2,375.87 or \$2,048 — whichever figure your Honors think Mr. Anderson intended finally to adopt — is not \$1,500 a year, as he claimed, but the sum of \$10,951.40. In other words, we propose to show by this witness that Mr. Anderson was five times out of the way, so to speak ; that he made out that the cost or price for water power in Springfield was four or five times more than it really was, for the purpose of comparing Springfield with Holyoke. Or, to put it conversely, as our expert prefers, that the proper figure to use for Holyoke in comparison is not \$1,500, but \$10,951.40. Now, it seems to me, if your Honors please, that it must be competent for us to show that fact, to put in by our own witness the expert opinion of a qualified water engineer, who has examined this water property itself, both at Springfield and Holyoke, as well as Mr. Anderson's

figures, that the proper sum to take for the Holyoke end of the comparison is \$10,951.40, and not \$1,500. In other words, it must be competent for us to show by independent expert testimony of our own that Mr. Anderson's calculation, upon which our brothers will rely, is four or five times out of the way.

The CHAIRMAN. What do you say, Mr. Goulding, to that?

Mr. GOULDING. I think the demonstration demonstrates nothing, absolutely. I have no objection to his showing, if he can, that Mr. Anderson's calculations are wrong. But Mr. Anderson has made no comparisons of Springfield with Holyoke with respect to the cost of power. He has come on here as an expert to testify to what he thought the property at Holyoke was worth, to give his opinion. Then he has given an independent piece of evidence, which was either competent or not objected to. It was that the cost to his concern here, the United Electric Light Company, was \$2,048 per mill power. Now, he did not compare that with Holyoke except in cross examination, and it was an immaterial matter that could have been objected to. It was immaterial for him to say that the \$2,048.70 compared with the \$1,500. That was a piece of evidence that was not competent, strictly, and was called out in cross examination. Now, they propose to go in and show by some sort of calculation that what he said in answer to their interrogatories in cross examination about the comparison was wrong, and by showing what it costs up at Holyoke to get the thing they get here at Springfield for \$2,048.70, as testified by Mr. Anderson. I submit that is not competent upon any principle of evidence. It does seem to me that the rules of evidence are somewhat constant, and some of us ought to know what the limitations are on this question of the comparative cost of things that are being valued. I understand we can put in sales, substantially sales. But I do not understand, as the counsel on the other side seem to claim, that you can call a witness and ask him the question as to what elements should enter into some calculation in order to impair the effect of evidence of a sale. I do not understand that you can call a witness for any such purpose. You cannot call a witness and say, "What

system of calculation should you enter into, Mr. Witness, to show that the sale, that has been offered in evidence here, of property similarly situated, doesn't really tend to prove the value of the property that we are valuing?" You cannot ask a witness such a question as that. That is the fact here, I submit. They are not confining themselves to any calculation that Mr. Anderson made in getting at his figures of the cost per mill power of power here in Springfield. They are not doing that at all. They are saying that in cross examination they got him to say that the \$2,048.70 was comparable or compared with the \$1,500 per mill power up there. That they did that in cross examination. Now I submit that it was an immaterial inquiry that they can't contradict in the first place, and they can't do any such thing as they propose. They are going to work to show the cost of mill power up there, when you take into consideration the lot of extra labor, and all that sort of thing, added to the \$1,500 per mill power. That is my contention about it. It is the same old question we have had for a day, now.

Mr. MATTHEWS. I should like to say just this. The quotations from the evidence of Mr. Anderson which I read a moment ago were taken from his direct examination, all of them, with the exception of corrections in the figures subsequently made, and one of those was taken from the re-direct. And I would like to add that if the purpose and purport of Mr. Anderson's testimony was not to erect or construct a comparison between this figure of \$2,375.87 in Springfield and \$1,500 in Holyoke for substantially similar industries, then I misunderstood the whole purport of his examination, and I am unable now to comprehend the meaning of the English language in what I have just quoted.

Mr. GOULDING. I don't suppose we want to misunderstand each other at all; but what Mr. Anderson said about \$2,048, or whatever it was, that variable figure, with the \$1,500, was in cross examination, the comparison was.

Mr. MATTHEWS. I beg your pardon.

Mr. GOULDING. The comparison in direct examination was of the water. He said the water would compare with the

surplus surplus. I think I am right about that. I think you will find the comparison of figures, of \$2,048 with the \$1,500, was in cross examination.

Mr. MATTHEWS. There was more about it in cross examination, and it was more explicitly shown; but the substance of Mr. Anderson's direct testimony was a comparison between \$2,375.87 in the one case and \$1,500 in the other. All the evidence he put in relating to Springfield had that in mind. He didn't state in direct examination that the price which the Electric Light Company actually paid was only \$600 per mill power by measured water; but he stated his conclusion for the purpose of comparison that it was the equivalent—that is his own word—the equivalent of \$2,375.87.

Mr. GOULDING. On page 230 he compares the cost of steam power in Springfield and Holyoke; but I look in vain for anything in his direct examination that undertakes to compare the \$2,375.87, which in some places took the form of \$2,048.70, with \$1,500 at all. You get into the cross examination, toward the end of it, before you get to any such comparison as that. So that I believe my statement is entirely correct, that the comparison of the figures per mill power in Springfield with the \$1,500 was brought out in cross examination. He did say that the water was comparable to their surplus surplus in Holyoke in his direct.

Mr. MATTHEWS. Then I would like respectfully to propound to my brother the question what his witness meant when he said that it is the equivalent of \$2,375.87 per mill power.

Mr. GOULDING. What did he say was the equivalent? It takes two terms to make an equivalent.

Mr. MATTHEWS. I want to know what you say the witness meant.

Mr. GOULDING. I say he meant what he said.

Mr. MATTHEWS. Now, then, in regard to the cross examination, it had the effect simply, if your Honors please, to show conclusively and explicitly what Mr. Anderson meant,—that is to say, that he meant to compare this \$2,375.87, or the corrected amount which he subsequently stated, with the \$1,500

that he thought ought to be paid in Holyoke. It is apparent, in substance, from his direct examination,—it was put in for that purpose, of course, and for no other, and counsel has frankly admitted this morning that he proposed to use it for that purpose and no other. It was a little more explicitly brought out in cross examination just what use Mr. Anderson made of this figure, and why he figured it out ; but it is in the direct examination in substance.

Mr. GOULDING. The question was : —

“Q. On the theory of rentals, Mr. Anderson, how much does your water power cost you per mill power per annum in the city of Springfield, delivered on your shaft? A. It is the equivalent of \$2,375.87 per mill power.”

Now, a man has got to have a pair of eyes such as Sam Weller didn't have, to see in that anything more than the statement that the power costs them \$2,375.87 per mill power, with no reference whatever to Holyoke. My friend says we intend to use it. We intend to use it in no other way than we should if we had called a man to testify to the sale of a piece of property which we say is similar to ours. He says it sold for \$500,000, and that is the end of it. It would not make it competent to call a witness, an expert, to show that that piece of property that was so sold was not worth as much as it was sold for, or that the property under valuation compared with that had certain dissimilarities which affected its value. I do not understand you can call an expert for any such purpose.

Mr. MATTHEWS. I would like to add to the discussion, if it will aid it in any manner, a few suggestions respecting the admissibility of similar questions in the valuation of real estate. An exactly similar class of questions would hardly arise where the only testimony regarding the value of real estate for either side was with reference to actual sales ; but, as we all know, that is not the only means of proving the value of real estate. That is the best evidence, of course ; but it is oftentimes lacking, as it is here. You can show the value of real estate, for instance, in an appropriate case by means of rents, and in estimating the value of real estate by means of rents you cannot, of course, rely upon gross rent : you must take into account all

the expenses for the up-keep of the property ; you must deduct also taxes, insurance, and similar items. The result of such a calculation or estimate is the net rent, which is the only thing that can be used by way of capitalization or otherwise to show as rent the value of the property in question. Now it often happens or sometimes happens (it has within my professional experience happened) that the experts on the respective sides of a controversy over the value of real estate have differed as to the mode in which the net rent should be computed. It often happens, also, that some of the items of outgo have to be estimated, not being capable of being shown by the books of the owner. In estimating what should be the annual load or burden upon the property for insurance there is considerable room for difference of opinion between experts. In like manner as to the items of repairs. I need not amplify these illustrations. Either side can show by expert testimony what the proper manner is by which to figure out the net rent of property, what elements it is proper to take into account, and how it is proper to reckon those elements. It seems to me that that is a fairly parallel case to the one that we have under discussion. I would like to add that these remarks of mine are intended as going to the general question under discussion, not particularly to the one which may have been pending at the time that I rose to speak. We claim the right to put in as independent evidence of our own the figure which it is proper to use for Holyoke, in comparison with Mr. Anderson's figures for Springfield ; and, incidentally and collaterally, we claim the right to expose, if we can, any errors that Mr. Anderson may have made. But the substantive fact that we wish to get in is the opinion of this witness as to what the proper figures for comparison should be.

The CHAIRMAN. Do you say that this witness has made an examination of this power at Springfield ?

Mr. MATTHEWS. I would like to ask my brother to ask the witness about that. I understand he has.

Mr. GREEN. Yes, I understand Mr. Main has.

Q. Mr. Main, will you tell us if you have made any examination of the water power used by the United Electric Light

Company and being at Indian Orchard? A. I have made a visit to the water power plant of the Electric Light Company, and looked it over.

Q. And have you familiarized yourself with the facts connected with it — the rent paid? A. From the evidence.

Q. From the evidence of Mr. Anderson? A. Yes.

Q. And the other facts stated by Mr. Anderson in his evidence in regard to the plant — loss of power in transmission? A. Yes.

Q. Are you acquainted with the way that the power is transmitted to Springfield? A. From his evidence.

Q. And from his evidence of the mechanism — devices used? A. Yes.

Q. And did you also see the machinery at Indian Orchard? A. I did.

Q. You have both seen it and taken the facts from Mr. Anderson's testimony? A. I have.

By the CHAIRMAN.

Q. Have you any computations or calculations or financial statement to make concerning Indian Orchard that have not already been stated in the case? A. No, sir.

Q. Nor any that have not already been stated in the Holyoke branch of this case?

Mr. MATTHEWS. That is what we are just asking him.

The CHAIRMAN. Allow me —

A. I have some.

Q. You have some? A. Yes, sir.

Q. That have not been stated as yet? A. No.

Q. Not with reference to Springfield, but to Holyoke? A. Yes.

Mr. GREEN. I understand that those computations add to the rental the same items Mr. Anderson added to his rental of \$600.

The CHAIRMAN. And that he had already done that.

Mr. BROOKS. Yes, he has.

Mr. GREEN. He has done that in one instance, but not in the second.

The CHAIRMAN. What is the second instance, if I may ask?

Mr. GREEN. He is getting at the \$2,190.28 he has added together, which I asked him a moment ago. He has treated of maximum mill power. Now the next question I would ask is, Dealing with it as average mill power, measured water, what would be his computations? We say that is a fair answer on Mr. Anderson's own statement of what they pay the \$600 for.

The CHAIRMAN. That is the rub, is it, that question?

Mr. MATTHEWS. Yes.

The CHAIRMAN. That is to say, your claim is that you should meet it on that principle — you can state it better than I can, Mr. Green.

Mr. GREEN. That they pay \$600 — I believe I am right — I am speaking from memory —

Mr. MATTHEWS. \$600 a year per mill power.

Mr. BROOKS. You have it right there in your schedule.

Mr. GREEN. For measured water. Now we say that estimating the power at Holyoke per mill power measured water, and using the given items that Mr. Anderson has used, except that we have to put in an interest rate for bonus on land and privilege, because they do not have any in Springfield, that instead of costing us at the rate of \$2,190.28, it costs us \$10,951.40.

Mr. BROOKS. I would like to ask where, in the testimony, does it appear that Mr. Anderson said that they pay for measured water.

Mr. GREEN. It appears in his cross examination again and again that they pay for the water as used.

Mr. BROOKS. That comes from your division, doesn't it?

Mr. MATTHEWS. No, sir, that comes from his direct statements.

Mr. BROOKS. He paid \$600 a year, as I recall it.

The CHAIRMAN. I thought that they got about 1,000 horse power that was delivered to them.

The WITNESS. Page 286.

The CHAIRMAN. 286, Mr. Main says.

Mr. MATTHEWS. Page 286.

“Q. Now, how is the quantity of water which you pay for at that price ascertained? A. By measurement of the gate opening at the water wheels.”

There is the answer to Mr. Brooks's question. And then I go on:—

"Q. That is, you measure up the actual amount of water that is consumed by your electric light plant? A. Yes, sir.

"Q. According to readings at the gates? A. According to readings at the gates.

"Q. And you pay for it according to the quantity used, at the rate of \$600 per mill power per annum? A. Yes, sir."

Mr. BROOKS. Yes, that is what is left.

Mr. MATTHEWS. What?

Mr. BROOKS. That is what is left after the previous—

Mr. MATTHEWS. Oh, there is a loss by transmission; we understand that.

Mr. BROOKS. That is the freshet water.

Mr. MATTHEWS. That is the price at Springfield.

Mr. GREEN. He stated that they paid no bonus, no interest on their bonus for land and privilege, and they pay \$600 for measured water. Now, in order to get the price, which is obviously used for comparison with Holyoke, he adds to that maintenance, extra labor, fixed charges, and loss in transmission. So if you are to compare it, if it is to be used for the purpose—

The CHAIRMAN. You also carry your comparison another step further. On the strength of the evidence it appears that there is measured water. Now let us see if we cannot work this out somehow. Therefore your claim is that, by the measurements that you have already taken, the amount of water that you have actually received would be, for instance, we will say, 200 horse power—and, of course, that is merely an estimate—and that that 200 horse power cost you so much; haven't you got that thing absolutely now?

Mr. GREEN. No, if your Honor please, there are some facts that are not in. If we are to use 3.36—

The CHAIRMAN. 3.36—that is it, is it?

Mr. GREEN. Yes, your Honor stated it correctly in the form of horse power; and are to pay for this what Mr. Anderson said that we could pay for it—that is, \$72,000 and a

rental—we say that it would cost us the amount which I have stated, \$10,951. Now, to get that, some computations of the extra charges, fixed charges, labor, and maintenance must be made.

Mr. BROOKS. You simply multiply your \$2,190.28 by 5. That is, you say that 16 mill powers is five times as much as you need, and that, therefore, your water is costing you—your 3 1-6 mill powers is costing you \$10,951.41. That is, you divide 16 by 3.16.

Mr. MATTHEWS. That may be Mr. Brooks's theory of what Mr. Main is going to say. We should rather rely on Mr. Main.

Mr. BROOKS. Well, you have your figures.

Mr. MATTHEWS. It may figure out that way. We should rather have Mr. Main explain it.

Mr. BROOKS. If that is the explanation, we say it is incompetent.

Mr. MATTHEWS. That goes to the weight, of course, rather than the competence.

Mr. BROOKS. I do not think so.

The CHAIRMAN. Perhaps this is a foolish question to ask. I confess I am in the air. I will ask it, subject, of course, to objection.

By the CHAIRMAN.

Q. Mr. Main, assuming that the Water Power Company only use 3.36, whatever it is, mill powers per annum, and the City is to pay \$72,000 bonus and \$1,500 rent on the principle of the use of 16 mill power, what, going on the principle that the water is to be measured, would that water power cost at Holyoke per mill power, or whatever you— A. It would cost \$10,951.40.

The CHAIRMAN. Why does not that cover your trouble?

Mr. MATTHEWS. I think it does, sir. That is what we have been trying to get in. We would like now to ask Mr. Main how he makes that calculation, how he works it out.

Mr. BROOKS. I would like to have that question read to Mr. Main once more, and see if he wants to stick to that, just in that—

The CHAIRMAN. I may not have phrased it correctly, but —

Mr. MATTHEWS. Perhaps Mr. Main will answer mine first, Brother Brooks.

The CHAIRMAN. Put my question first.

Mr. BROOKS. It seemed to me he ought to have a chance to explain it, because as the question was put his answer was wrong.

Mr. MATTHEWS. I asked him how he figured it out.

(The Chairman's question was read.)

Mr. BROOKS. I presume what your Honor meant was, What would the 3.36 cost?

The CHAIRMAN. Yes, that is what I meant; change that.

The WITNESS. I should only qualify that answer by saying approximately.

By the CHAIRMAN.

Q. Approximately how much? A. \$10,951.40.

By Mr. GREEN.

Q. Now, will you answer the question suggested by Mr. Matthews; tell us how you arrive at that result. A. All of the items of cost which appeared in the cost per maximum horse power at Holyoke were based on 16 mill powers. The actual amount used —

Mr. BROOKS. All this is under our exception.

A. — for running time was 3.36 mill powers and for 365 days in the year 3.16 mill powers. The ratio between 16 mill powers and the actual amount used was a little more than 5, but I have assumed that 5 was near enough to use, so that each item of cost per maximum mill power would cost per average mill power five times the cost per maximum.

Q. Have you incorporated into the items used in this total of \$10,951.40 the same items incorporated by Mr. Anderson in his total of \$2,048.70?

Mr. GOULDING. I object.

The CHAIRMAN. Well, that is for us to determine.

Mr. GREEN. I suppose so. I suppose, if that is objected to, they can be read off.

Q. You say you used the same items that you used in your maximum comparison? A. I have.

Q. There is a question I wish to ask you before I forget it. Can you tell us the percentage of loss in transmission of power in the station at Holyoke from the shaft to the switchboard?

A. It is about 30 per cent. from the wheels to the switchboard.

Q. Can you tell us on your computation of the average horse power used at the wheels—being 183 horse power, as I understand it—the amount of power that gets to the switchboard?

Mr. GOULDING. You are talking about Holyoke?

Mr. GREEN. Yes, at Holyoke. I am talking about Holyoke now.

Q. You would subtract the 30 per cent. of 183, I suppose? I did not know but you had it. A. Yes, that is correct.

Mr. BROOKS. The question was from the shaft to the switchboard.

The WITNESS. About 128 horse power at the switchboard at Holyoke.

Mr. BROOKS. I don't know what that answer is.

The CHAIRMAN. 30 per cent. off from 183.

Q. Will you for our future use, supposing that there are 23 days of restriction and 5 other days—supposing that there are only 28 days in which we have to run by steam, and the rest of the time you can run by water—tell us the number of horse power hours that the station would be run by water? A. 1,035,264.

Q. Will you make a further computation for us? Will you compute or multiply out for us the 1,035,264 horse power hours by 49-100 cents and give us the result in dollars and cents? A. \$5,072.79.

Mr. GREEN. I would like to ask the witness to make some computations which are involved and long, which would save time, I think, in making.

Q. Taking an average load of 661 horse power 24 hours a day and 365 days in a year, have you reduced that to horse power hours? Turn to page 47. A. 661 horse power?

Q. Yes, 661. A. 24 hours a day—

Q. 24 hours a day and 365 days a year gives how many horse power hours? A. 5,790,360.

Q. Have you multiplied \$2,617 by 10.1? A. I have.

Q. Will you give me the result?

Mr. BROOKS. What is that for?

Mr. GREEN. It is for ease in argument later on — saving of time.

The CHAIRMAN. You have certainly got to state, if they ask, what you want of it.

Mr. GREEN. Certainly. It is obviously, as I supposed, in connection with the Springfield case. We want to reduce the amount of power to horse power hours.

Mr. GOULDING. This is an incorporeal reason?

Mr. GREEN. And there will be a fair comparison to be made in connection with the cost of water power at Springfield and at Holyoke, to be ascertained by reducing the power to horse power hours. Now, we do not ask him for any results. We ask him for a few computations which are long and involved, because we think they will aid anybody, counsel or Commission, in figuring it out.

The CHAIRMAN. Have you any objection?

Mr. BROOKS. No, not if it is for ease in argument.

The CHAIRMAN. What?

Mr. BROOKS. If it is only put in for ease in argument, I have no objection.

Q. You say you have multiplied \$2,617 by 10.1, and what is the result? A. \$26,431.70.

Q. Have you divided \$26,431.70 by 5,790,360? A. I have.

Q. And what does that equal? A. .457 of a cent.

Q. Have you multiplied the 1,504,652 by .457 of a cent? A. I have.

Q. What is the result? A. \$6,876.26.

Q. Have you multiplied the \$6,876.26 by 70/85? A. I have.

Mr. BROOKS. I think I will object now, may it please your Honor. I cannot see how it is going to ease me in my argument.

Mr. MATTHEWS. It isn't put in for that purpose, Mr. Brooks.

The CHAIRMAN. If it is objected to, it is excluded.

Q. Will you tell us, Mr. Main, if there are losses in the transmission of power at Springfield other than those found at Holyoke?

Mr. BROOKS. I object to that question.

Q. From the wheel to the switchboard?

Mr. BROOKS. I object to the question.

The CHAIRMAN. If the witness depends upon evidence already stated, it is excluded.

Mr. GREEN. As I understand, he depends not on that alone.

The CHAIRMAN. What does he depend on?

Q. Do you know, Mr. Main? I think my question was if he knew. A. I depend for the loss at the Springfield station on testimony given.

Q. And at the Holyoke station? A. My own opinion.

Q. The losses in Holyoke are between what two points?

The CHAIRMAN. You have already given those, haven't you? He says he depends upon Mr. Anderson for the other.

Q. Can you refer us to the page in Mr. Anderson's testimony where the losses appear; that is, where he testified in regard to the losses? A. Vol. V., pages 364 to 369.

Q. Do you refer to the place where this question and answer occur on page 364?—

“Q. You have testified, I think, that you lose in water power by transmission to Springfield 25 per cent? A. Yes, sir.

“Q. You were asked, as I recall it, by Mr. Matthews, how much the Holyoke water power lost; and I think you said in substance 10 or 15 per cent. up to the moment of distribution.”

And Mr. Matthews says: “Up to the switchboard.”

A. That is part of it.

Q. And then this question: “Is there any additional loss?”—

The CHAIRMAN. This witness says he depended on that evidence; that is sufficient.

Mr. GREEN. He said that and some of the additional evidence.

Mr. BROOKS. No, nothing about additional evidence.

Q. And that is in those pages? A. Yes.

Mr. GREEN. The rest of that is simple computation. I think the rest of that we can make ourselves. I would like to give two questions to the stenographer for your Honors to consider. I think they are a little different from those asked. I would like to ask your Honors to consider them during the noon hour, and then I will pass on. The first question is this:—

“Q. What is the maximum that can be paid for water power in Holyoke, for the kind of power offered, if Holyoke is to pay no more for water power than is paid in Springfield by the United Electric Light Company?”

Mr. GOULDING. I object.

Mr. GREEN. I presume likely. Second:—

“Q. What should be paid for the water power offered by the Holyoke Water Power Company on the basis of the price paid for water power by the United Electric Light Company?”

Mr. BROOKS. We object.

Mr. GREEN. We have similar questions as to Hartford; but those will answer.

Q. Mr. Main, you have given us in your valuations a fair market value of the land or of the water power, one or both, for other purposes.

Mr. BROOKS. Where is that? Where does that appear?

Mr. GREEN. That is the fifth valuation that he gave. It was in his testimony in Boston and in his summary.

Mr. BROOKS. But there has been no schedule?

Mr. GREEN. No schedule.

Q. Will you explain to us how you arrive at that valuation? and, if you have a schedule made of the figures which lead to that, you may produce it. We can follow it easier with the schedule.

Mr. BROOKS. Wait just a minute. Where does he give that?

Mr. GREEN. It is the fifth valuation that is stated in his summary, Schedule 1 of this witness.

Mr. BROOKS. I do not recall that testimony in Boston. What page is it on?

The CHAIRMAN. Here is the book, here.

Mr. BROOKS. I made a digest, as I thought, of his testimony. I do not find any such thing.

Mr. GREEN. I thought it was given there. It certainly has been put in as a part of Schedule 1.

The WITNESS. It was put in in Boston.

Mr. GOULDING. Was it read from this schedule?

The WITNESS. Yes, sir.

Mr. GREEN. It was put in before I offered the schedule in evidence. I put in all the values before I offered this schedule.

The CHAIRMAN. We had better stop until two o'clock.

(Noon recess.)

AFTERNOON SESSION.

CHARLES T. MAIN, *resumed.**Direct Examination by MR. GREEN, continued.*

The CHAIRMAN. Mr. Green, we have examined those questions, and we think we shall exclude them.

Mr. GREEN. As applied to either or both of the plants?

The CHAIRMAN. Yes, sir.

Mr. GREEN. Your Honor will save us on those questions. As I understand, it is Hartford and Springfield alike. Mr. Main, will you give me Schedule 22?

(Schedule 22 introduced in evidence and marked "Exhibit 177, W. L. H.")

[EXHIBIT 177.]

SCHEDULE 22.

VALUE OF 16 24-HOUR NON-PERMANENT MILL POWERS FOR PAPER MILLS.

Estimated cost of water power plant for 16 M. P. \$69,850.00
Cost of running, omitting interest on land and water privilege and rental for water, would be as follows:—

Fixed charges, interest 5%, depreciation and repairs 1%		
insurance and taxes 1% = 7%	\$4,889.50	
Attendance, 1 man $\frac{1}{2}$ his time, 24 hours	612.00	
Oil, waste, and supplies	300.00	\$5,801.50

The cost of a supplementary steam plant would be about
\$45 a H. P., or \$45,000.

Fixed charges at 8%	\$3,600.00
Fire and boiler insurance	150.00

Coal for 23 days @ 2 lbs. per H. P. per hour and \$4.05 a ton:

1,000 H. P. x 2 lbs. x 24 hours x 23 days = 493 tons.
2240

493 tons @ \$4.05	1,996.65
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Attendance: 2 engineers @ \$3 each = \$6

4 firemen @ 2 " = 8 \$14

\$14 a day x 40	560.00
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Oil, waste, and supplies	\$100.00	
Carting ashes, 40 tons @ 25c.	10.00	\$6,416.65
Total cost of supplementary power and water power.		\$12,218.15

COST OF 1,000 H. P. BY STEAM POWER ALONE.

The cost of a 1,000 H. P. steam plant to run all the time would be about \$50 a H. P., or slightly more on account of having it somewhat more economical and larger than a plant used for supplementary power only.

Fixed charges at 10% on \$50,000	\$5,000.00
Boiler and fire insurance	162.50
Coal at 1.6 lbs. per H. P. per hour and \$4.05 a ton:	
1,000 H. P. x 1.6 lbs. x 24 hours x 306 days = 5,246 tons @ \$4.05	21,246.30
2240	
Attendance: 2 engineers @ \$3 = \$6	
4 firemen @ 2 = 8 \$14 x 306	4,284.00
Oil, waste, and supplies	1,025.00
Carting ashes, 402 tons @ 25c.	100.50
Total cost of steam power alone	\$31,818.30

\$31,818.30 — \$12,218.15 = \$19,600.15, difference in favor of water power.

\$19,600.15 ÷ 16 = \$1,225 a M. P.

With coal at \$4.05 a ton, paying nothing for land and allowing nothing for use of exhaust steam, in order to produce power at the same cost as steam power \$1,225 a M. P. could be paid for rental of water.

Assuming that 25 per cent. of the exhaust steam can be used, and that coal will cost in large quantities \$3.75 a ton, the difference in favor of water power is \$15,715.19.

\$15,715.19 ÷ 16 = \$982.20 a M. P., which could be paid for rental, with no charge for land and no other conditions considered.

Assuming 16,000 sq. ft. of land per M. P., or 256,000 sq. ft. for 16 M. P. at 35c. a sq. ft. for land and privilege, the gross amount would be \$89,600.

\$89,600 x .05 = \$4,480 ÷ 16 = \$280 a M. P.

\$982 — \$280 = \$702, could be paid rental with the average amount of land and privilege at 35c. a sq. ft.

If \$4,500 a M. P. is paid for privilege, the interest on this is \$225 a year, and rental could be \$982 — \$225 = \$757.

CONCLUSIONS.

In order to come out just even, no other conditions being considered, the following rentals could be paid:—

1. Nothing paid for land, rental \$982 a year a M. P.
2. Land and privilege at usual prices 702 " " " "
3. " " " " \$4,500 a M. P. 757 " " " "

4. Taking into consideration that a more complicated plant is required with water power and supplementary steam power, greater loss by friction, and the necessity of a greater investment, \$600 per M. P. rental is a fair price to pay when \$4,500 bonus is paid, or land is bought at usual prices; or \$825 is a fair rental when nothing is paid for land.

Q. Schedule 22, which has just been marked, relates to the value of non-permanent mill power. I notice that you say "paper mills." It is any mill, I understood you to say somewhere else, that uses power continuously and has a uniform load? A. Yes, continuously for six days in the week.

Q. That is what you consider in this Schedule 22? A. Yes.

Q. And the paper mill is merely an illustration? A. Yes.

Mr. BROOKS. Excuse us just a minute, Mr. Green.

Mr. GOULDING. We are not aware that this witness is qualified to testify on the subject that he now is proposing to testify upon. That is to say, I do not understand, so far as the evidence has gone in, that he has ever bought or sold or run or operated a paper mill. I think he must either have bought or sold or operated them.

Mr. GREEN. I do not know whether the witness has bought or sold paper mills. I assume very likely he has not.

The WITNESS. I have not.

Mr. GREEN. I do not know whether he has bought or sold power to be used in connection with a paper mill, but I understand that he is familiar with water power used in connection with various manufacturing businesses that run six days in the week and use a uniform load, and I did not think it was necessary to ask him if he was familiar with the load that was used in a paper mill, or knew whether it was uniform or not. I will ask that question.

Q. Are you familiar with the nature of the load used in a paper mill? A. I am somewhat familiar with the load and the use of power in paper mills, having made a study of two or three mills.

Q. Paper mills? A. Paper mills.

Mr. GOULDING. This is the value of power for the purposes of a paper mill. I should suppose a man would have to be acquainted with the business to put a value upon power for that purpose.

Mr. GREEN. I understood that the witness had made a study of the subject of power in connection with such mills in two or three instances.

Q. Will you state the instances? A. About ten years ago I applied to the engine of the Tileston & Hollingsworth Paper Company at Mattapan a receiver pressure regulator, for the purpose of using some of the steam from the engine for manufacturing purposes, and at that time I made some study of the use of power and steam in the mill. About two or three years ago I made a study of the power question at the Hollingsworth & Whitney Paper Company at Waterville, Maine, and made preliminary plans for a new steam plant there. Those are the most important, the most thorough cases, that I can speak of. I have made some examinations of paper mills with reference to damages caused by the taking of water, and have made some study of the power in that connection.

Q. When you speak of taking water, you mean the water power? A. Water power.

Q. And are you familiar—I don't know but I asked this before—are you familiar with the prices charged and paid in Lowell and Lawrence for powers of various kinds, permanent and surplus? A. I am.

Q. Day and night load both? A. Yes.

Q. And whether or not there are mills there that use water for a uniform load? A. Yes.

Q. And are you familiar with those mills and the use of power in those mills? A. Quite a good many of them.

Mr. GREEN. I don't know that I care to ask anything more.

The CHAIRMAN. Will you question him, Mr. Goulding?

By Mr. GOULDING.

Q. I understand there are two cases where you made a study of power? A. Yes, sir.

Q. One ten years ago and the other how long ago? A. About two years ago.

Q. What kind of power were you dealing with? A. That was at the Hollingsworth & Whitney Paper Company at Waterville, Maine, where a part of the power is water power and the rest of it is steam power, and we made preliminary plans for a new steam plant and made a study of the power at that time.

Q. Did you make a study of the value of power for the use of a paper mill at that time? A. Not the value, the use; the use of the power.

Q. For the purpose of a paper mill? A. Yes, sir.

Q. Do you know anything about the paper business done there? I mean to say what the amount of business done was, and what fraction of the whole operating expenses was charged to power, or anything of that kind? A. No, sir, I didn't go into the details of that description.

Q. And didn't study anything in connection with the value of power there to make paper? A. No, I did not.

Q. Then the other one was where? A. That was at the Tileston & Hollingsworth Company at Mattapan.

Q. How long ago? A. About ten years ago.

Q. What did you do there? A. Made some study of the power there with regard to the use of power and steam for manufacturing purposes other than power.

Q. For the purpose of seeing which was the cheaper? A. No, for the purpose of using some of the exhaust steam from the engine after it had produced power,—using it for manufacturing purposes.

Q. Then you were not studying the value of power there for the purposes of manufacturing paper? A. No, sir.

Q. That is your experience, with the exception that you have been called as a witness where power has been diverted in cases; and there have you studied the value of power for the manufacturing of paper—the value of it? A. The value of it in connection with the paper mill where it was used.

Q. With reference to the manufacture of paper? A. I think so, yes.

Q. Where was that? A. At the Tileston & Hollingsworth Company at Hollis, I think, on the Nashua River, and at the Nashua River Paper Company, with which case you are familiar.

Q. And there you have simply been retained to examine a question, and have examined it? A. I have.

By Mr. GREEN.

Q. Was that for the purpose of giving testimony? A. It was.

By Mr. GOULDING.

Q. How much was water power and how much steam power at the plant in Maine that you have studied? A. There was about a maximum of 5,000 horse power of water power which dropped off during the low flow of the river quite considerably, sometimes down to one or two thousand horse power; and the steam power plant that was there when we made our first study was not sufficient to run the whole mill during the periods of low flow of the stream. I should say they had perhaps 2,000 horse power of engines.

By Mr. GREEN.

Q. In connection with the Lyman Mills case in Holyoke, did you, if I may ask, make any study of the use of power generally among the paper mills? A. I did not.

Mr. GREEN. We submit, if your Honors please, that he is qualified to testify.

The CHAIRMAN. To testify to what?

Mr. GREEN. As to the value of non-permanent mill power in Holyoke for use in any mill that uses uniform power six days in the week. The paper mill is merely an illustration.

Mr. BROOKS. Well, we submit he is not.

The CHAIRMAN. Have you Mr. Allen's testimony.

Mr. GREEN. Mr. Allen's? Yes, sir.

The CHAIRMAN. Let me see it a minute.

Mr. GREEN. I would suggest that the evidence itself was admitted at Boston. The valuations were all given. We are simply asking now for the details of that valuation.

The CHAIRMAN. Well, I want to see that evidence. I think that is so. This is what the report says (reading from testimony of Mr. Main, p. 16 of this volume):—

"Q. Assuming that there was a sufficient area of land, what, in your opinion, is the fair market value of the water power, of the 16 non-permanent mill power, which is offered in this case? That does not include any valuation of land. It simply assumes that you have an area large enough to use it, and it does not include the water plant.

"Mr. BROOKS. It simply includes water power.

"Mr. GREEN. Water power.

"A. \$825 per mill power per year, if nothing were paid for the land, or \$600 per mill power per year, if \$4,500 were

paid per mill power for the privilege accompanied by the usual area of land."

Is there anything more, Mr. Green?

Mr. GREEN. I think not.

The CHAIRMAN. He was asked (testimony of Mr. Main, p. 17):—

"Q. What, in your opinion, is the fair market value of the land, water power privilege, and water power, for the purpose of running this electric light station, on the supposition that \$72,000 is to be paid as bonus and \$24,000 per annum rental?

"Mr. BROOKS. This is under our exception,—all this.

"Mr. GOULDING. That certainly goes beyond the Cochrane case.

"A. It wouldn't have any value for this purpose.

"Mr. BROOKS. Wait a moment. Is this question admitted, your Honors?

"The CHAIRMAN. How much did you say, Mr. Witness?

"The WITNESS. It wouldn't have any value for this purpose."

We didn't seem to regard Mr. Brooks's question at all.

"Q. What would you say as to the fair market value of the same that you have just spoken of, if \$72,000 must be paid for the privilege, and \$12,000 per annum rental for eight mill powers? A. It would then not have any value for this purpose.

"Q. On the supposition that \$36,000 must be paid for the privilege, and \$1,200 rental? A. It would then not have any value for this purpose."

Mr. BROOKS. On page 1952 the question is this (reading from typewritten copy of Mr. Main's testimony, p. 16 of this volume):—

"Q. Assuming that there was a sufficient area of land, what, in your opinion, is the fair market value of the water power, of the 16 non-permanent mill power, which is offered in this case? That does not include any valuation of land. It simply assumes that you have an area large enough to use it, and it does not include the water plant."

And I say: "It simply includes water power."

And Mr. Green says: "Water power."

And the answer is :—

“\$825 per mill power per year, if nothing were paid for the land, or \$600 per mill power per year, if \$4,500 were paid per mill power for the privilege accompanied by the usual area of land.”

That is the only thing that I see.

Mr. GREEN. It is this identical valuation that we are offering now in the details.

Mr. BROOKS. You have not asked him about any paper mill, or anything else than for this present purpose.

The CHAIRMAN. Well, I don't see that this schedule, glancing over it, has much to do with that. I have not read it, of course. Your first question, evidently, under this schedule would be: “What is the estimated cost of a water power plant for 16 mill power?”

Mr. GREEN. Yes, sir.

The CHAIRMAN. And he has got some figures here where he answers. Now, how is he qualified to testify to the cost of a water power plant for 16 mill powers?

Mr. GREEN. I understand that he has already testified to the cost of a water plant at this very place, and the testimony is admitted. He testifies to the value of it, what it costs. He is familiar with the value of water wheels and what it costs to put them in.

The CHAIRMAN. Isn't that all you need, Mr. Green?

Mr. GREEN. No, sir, I think not. You get at the cost what it costs to put in a water power plant. It does not tell the whole story of what your water power costs you, any more than the cost of putting in a steam plant tells what the steam power costs.

The CHAIRMAN. Yes, but you are now trying to find the value of water power, aren't you — or the water power plant? What are you trying to find?

Mr. GREEN. It is another form of asking this question: What is non-permanent power worth in Holyoke for the most valuable use to which it can be put?

The CHAIRMAN. In this Schedule 22 you ask for the cost of water power plant. In that original question you asked the worth of water power.

Mr. GREEN. No, I do not, only so far as the water power plant is incidental to determining the final question, What is the value of 16 24-hour non-permanent mill powers for use in a mill which runs 24 hours a day with a changing load, such as a paper mill?

The CHAIRMAN. Then this schedule — apparently I am mixed up on it. What are you trying to do here in this schedule, if I may ask?

Mr. GREEN. This schedule contains the details by which the valuation which your Honor read in the printed testimony is arrived at.

Mr. BROOKS. I do not so understand it.

The CHAIRMAN. I understood your question did not involve paper mills. It involved any mill running 24 hours.

Mr. GREEN. Yes, as a paper mill.

The CHAIRMAN. As a paper mill?

Mr. GREEN. Yes, I used that as an illustration — “as a paper mill.”

The CHAIRMAN. I do not see of what importance that is.

Mr. GREEN. . I do not know as it is of any particular importance except that your Honor had got in this case one valuation apparently for the purpose of its use apart from any other purpose, and we assumed that it was notorious that paper manufacturing was the chief industry in Holyoke, so this bears on the question, What is its value for any other use?

The CHAIRMAN. Without touching the schedule at all — perhaps it will be just as well to leave that —

Mr. GOULDING. I do not care anything about the schedule as a schedule, but the question we raised was as to his competency to testify as to value for a paper mill.

The CHAIRMAN. I understand he has withdrawn that; it is the general value of water power used at Holyoke to the extent of 16 mill power for 24 hours. That is about the proposition, isn't it?

Mr. GREEN. That was the question as I asked it, using a paper mill simply as an illustration.

The CHAIRMAN. Well, do you leave out “paper mill” or keep it in?

Mr. GREEN. I would just as soon leave it out, personally; I do not care anything about use as a paper mill in that connection. It is simply illustrative of a continuous power.

The CHAIRMAN. Let us understand what the question is.

Mr. COTTER. We understand that you strike out "paper mill," Mr. Green?

Mr. GREEN. If your Honor will allow me to take the evidence. (Taking from the Chairman a printed copy of Mr. Main's testimony.) The following question was asked Mr. Main:—

"Q. Assuming that there was a sufficient area of land, what, in your opinion, is the fair market value of the 16 non-permanent mill power, which is offered in this case?"

To which he answers:—

"A. \$825 per mill power per year if nothing were paid for the land, or \$600 per mill power per year if \$4,500 were paid per mill power for the privilege, accompanied by the usual area of land."

Q. Have you the details with you, the computations by which you arrived at that result? A. I have.

Q. And that is schedule what? A. 22.

Mr. GREEN. I offer Schedule 22 in evidence.

Mr. BROOKS. We object to it.

The CHAIRMAN. Now let me see that printed proof just a moment, Mr. Green.

(Mr. Green handed the testimony to the Chairman.)

The CHAIRMAN. We do not see why the witness cannot give his reasons for answering that question. I suppose it is objected that he is not competent; but, if he is competent, I do not see why he cannot put it in. I do not say that he can put your schedule in, but I do not see why he cannot give his reasons for that valuation. I think that the objection goes to the weight of it, under all the circumstances. We will allow him to give his reasons. You desire to except, I suppose, Mr. Brooks?

Mr. GOULDING. I think your Honors will see that this schedule is really an attempt to show its value for a paper mill,

inasmuch as on the second page he gives the condition of using the exhaust steam and not using it.

The CHAIRMAN. Yes, sir, but I do not know how he is going to put it, in what shape.

Mr. GOULDING. I do not care to stand upon the question whether he should testify upon a schedule or by question and answer; I do not care about that if he is competent.

Mr. GREEN. I see no reason why the witness cannot testify for the specific purpose of its use in connection with a paper mill, that being one of the well-known industries of Holyoke; and I think he showed sufficient familiarity with the use of power in a paper mill to do so.

The CHAIRMAN. We will eliminate it, Mr. Green, so as to put it entirely on a mill running in Holyoke; it does not make any difference whether it is a paper mill or what it is. Now you may ask him his reasons, if you wish to, for giving that opinion.

Mr. GREEN. Do I understand your Honor would eliminate now and rule that he cannot testify to its value for use in connection with a paper mill?

The CHAIRMAN. I do not say that; but I was going to make the suggestion that it makes no difference.

Mr. GREEN. Do I understand that Schedule 22 is admitted or not? I do not know whether it is objected to or not.

The CHAIRMAN. I do not know as it is, but I told you you could ask this witness for his reasons for the faith that is in him. I do not know what the answer is going to be. I do not understand that any intimation is made that they object to it as a schedule particularly.

Mr. BROOKS. If your Honors are going to rule that he in substance can read the schedule as his reason, why, of course, we do not care to stickle upon the propriety of his putting it in as his reason. It amounts to the same thing.

Mr. GREEN. I suppose he can use the schedule to refresh his recollection.

Mr. BROOKS. That is what it amounts to.

The CHAIRMAN. Personally I should certainly rule that he could do it. I think it is good sense, and the other rule is

the contrary; but I should certainly yield to the suggestion of older practitioners than myself and more experienced, and rule that he must only refer to it as a memorandum to refresh his recollection. Now if you wish that he should use this schedule as a part of his reasons, by way of referring to it—anything, Mr. Green, he can do that.

Mr. GREEN. I have offered it for that purpose, to make it more easy for us to follow the witness.

The CHAIRMAN. Do you object to it, Mr. Brooks?

Mr. BROOKS. Certainly.

The CHAIRMAN. If you put it on the ground that you just have, he must take this thing and refer to it, if he chooses to, to refresh his recollection, or not depend on it. I should think the simplest way was to let the schedule go in.

Mr. GOULDING. Let him go on.

Mr. BROOKS. Let him go ahead.

Mr. GREEN. Then I understand that is in evidence.

Mr. BROOKS. No, I do not so understand; do you?

Mr. GREEN. I thought you—

Mr. GOULDING. I understood he was going to give his reasons from this schedule, and we will not object.

The CHAIRMAN. That is what I understood; let him do it.

Mr. GREEN. I will. It has been customary in the case thus far to admit schedules; and I had offered it as a matter of ease, for the purpose of following the witness.

The CHAIRMAN. You know, Mr. Green, you cannot make a schedule evidence if it is objected to.

Mr. GREEN. I understand it, of course.

Mr. BROOKS. Oh, we do not object to it because it is a mere schedule. If your Honor is going to rule that he can state orally what is in his schedule as testimony, we are not going to stand in the way of his putting in his schedule. We only object to it as a reason.

The CHAIRMAN. You object to it as a reason?

Mr. BROOKS. Yes, sir.

The CHAIRMAN. You object to his competency to testify to it as his reasons?

Mr. BROOKS. Yes.

The CHAIRMAN. We overrule that.

Q. You may proceed, Mr. Main, and give your reasons.

Mr. BROOKS. Your Honor will save an exception to this and all that testimony.

The CHAIRMAN. I understand there is no objection to the schedule going in; they do not raise any question of that kind.

Mr. GREEN. They have not said so to us. I have asked them twice, and I have not been able to find out whether it was objected to or not.

Mr. BROOKS. I said distinctly that, if he could recite orally the contents of his schedule as his reason for his arriving at a certain conclusion, we were not going to stickle upon the question of his putting in his schedule.

The CHAIRMAN. Give your reasons, Mr. Witness.

Q. You may proceed and give your reasons. A. The reasons and the methods are really one combined.

Q. Well, you may proceed in your own way. Show how you work it out. A. The methods and reasons of reaching this result are as follows: I first ascertained the cost of running the water power, omitting the interest on land and water power privilege and rental for water, which I found to be \$5,801.50. I then ascertained the cost of running a supplementary steam plant for the purpose of making up the lack of power when water could not be furnished, and found that the annual cost of that would be \$6,416.65. Adding these together gave me the total cost of supplementary power and water power as \$12,218.15. I then ascertained the cost of running 1,000 horse power by steam alone, and I found that for the year this would amount to \$31,818.30. Deducting the cost of water power and supplementary steam power from the cost of steam power alone, I found that there was \$19,600.15 difference in favor of water power. This was for 16 mill power. Dividing \$19,600.15 by 16, I obtained \$1,225 a mill power. That is, using coal at \$4.05 per ton and paying nothing for land and allowing nothing for the use of exhaust steam, in order to produce water power at the same cost as steam power, \$1,225 per mill power could be paid for rental of water.

Q. It is on those suppositions as to cost of coal, and so on?

A. On those suppositions as named. I then proceeded to see what difference it would make when using 25 per cent. of the exhaust steam from the engine for other purposes than power, and if coal could be purchased at \$3.75 per ton instead of \$4.05. This made the difference in favor of water power \$15,715.19 for 16 mill powers, or \$982.20 per mill power, which could be paid for rental with no charge for land and no other conditions considered. I then assumed that 16,000 square feet of land should go with each mill power of water, making a total of 256,000 square feet for the 16 mill powers, and that the price of such land should be, I assumed, 35 cents a square foot, making a gross sum of \$89,600. This amount at 5 per cent. interest is \$4,480, which divided by 16 mill powers gives \$280 per mill power. Subtracting this from the \$982 leaves a balance of \$702, which could be paid rental with the average amount of land and privilege paid for at 35 cents per square foot. If \$4,500 a mill power is paid for privilege, the interest on this is \$225 a year, and the rental would then be \$982 minus \$225, equals \$757. The conclusions which were reached from those three computations were as follows: that in order to make the cost of water power and steam power the same without considering any other conditions the following rentals could be paid:—

1. If nothing was paid for land, a rental of \$982 a mill power could be paid.
2. With land and privilege at usual prices, \$702 a year a mill power.
3. With land and privilege at \$4,500 a mill power, \$757 a year a mill power.

And then, fourth, which is a separate consideration, I took into consideration that a more complicated plant would be required with the double plant of water power and steam power than with the steam power alone, and that there would be certain other losses, greater losses, in the combined plant than with the single one, and that there was a necessity of greater investment with the two plants than with one. And for those various reasons I came to the conclusion that \$600 per mill

power was a fair rental to pay when \$4,500 bonus was paid, or when the land was bought at the usual prices, or that \$825 was the fair rental to pay when nothing was paid for the land.

By Mr. BROOKS.

Q. \$4,500 bonus — \$4,500 a mill power? A. A mill power.

By Mr. GREEN.

Q. And when you say nothing is paid for land, does that mean land and privilege — your last sentence? A. It does.

Q. I notice at one point you state: —

“Assuming 16,000 square feet of land per mill power, or 256,000 square feet for 16 mill power.”

Why do you assume those amounts? A. I took the map which has been put into this case as an exhibit, showing the number of mill powers and the areas of land that accompanied them, and worked out the average number of square feet per mill power, and assumed about that average as being a proper amount to consider here.

The CHAIRMAN. Is that objected to? If that is in under objection, I hesitate about its competency on the present evidence.

Mr. BROOKS. Of course, I have a general objection on this.

The CHAIRMAN. I do not think you had better,—well, yes, you would have a right to a general objection to his reasons.

Mr. BROOKS. If they ask him for his reasons, I don't know how we can stop it.

Mr. GREEN. We shall claim, if your Honor please, in connection with this, that it is proper to bring to the attention of the Court the amount of land that generally goes with a mill power of water in Holyoke, because the claim is made here that the bonus of \$4,500 covers the land and privilege. It will also be the contention in our case, on which we shall produce some additional witnesses, that 16 mill power is not available with this piece of land; that you have something like 28,000 square feet available for building purposes, and that the size of land is

disproportionate to the water power with which they attempt to load it; that it is not salable except to be used in connection with very few mill powers. We think that it has some bearing and is of some weight in this case, considering that the Holyoke Water Power Company has disposed of all the land and water power in question, to know the average amount of land that accompanies a mill power of water at Holyoke. We think we have a right to take the average, and, as long as it is purely an average, I do not see why this witness cannot figure that average as well as anybody else.

Mr. GOULDING. They spent considerable time in Boston in showing that the area was too large, that it was of very little value because it was too large. You had two or three witnesses to prove it.

Mr. MATTHEWS. No, that it was too small.

Mr. GOULDING. You proved by Mr. Warner that it was too large.

Mr. GREEN. I think Mr. Goulding misapprehends us. Our contention is that the buildings are too large for the purposes of an electric light station. They have put in some evidence on the other side as to the value of a mill power. They offer 16 mill power. They claim,—I may misunderstand their claim, but I understand they claim that we should take it because those 16 mill power are appurtenant to this amount of land. Now we say that for the purposes of its use it is not suitable to the purpose of an electric light station, because there is too much power, and they do not offer it on terms at which an electric station can afford to buy it. We say that for any other purpose—and I now have reference to a second clause in the statute which may be of some pertinence in this case—that it is not of so much value, because they have harnessed up with it too much power. We claim that they offer us too much power to be used in connection with an electric light station. But now we are dealing with the question of what it is worth for some other use, under that clause of the act which says that no portion of the plant is to be estimated at less than its fair market value for any other purpose.

The CHAIRMAN. There is evidently a very large argument on this suggestion, and perhaps the way now will be to ascertain the fact whether Mr. Main has so used it; but the Commissioners have not passed on the effect of this testimony.

Mr. GREEN. That would be very proper. Your Honors understand that we are embarrassed because we do not know just how far the Commission will apply that clause in this act.

The CHAIRMAN. All right. Then let it stand that way, on that understanding.

Q. In connection with this case have you ascertained or received any information from Mr. Waters, the treasurer of this Company, whose name is mentioned here, as to the price obtained by the Holyoke Water Power Company for non-permanent power?

Mr. BROOKS. My attention was distracted. May I have the question read?

(The question was read.)

Q. Whether you have or not? A. I have.

Q. Now I should like to ask what was told you by Mr. Waters.

Mr. BROOKS. I object. I do not see how that can be competent.

The CHAIRMAN. Can you show that he is qualified to make admissions for the corporation?

Mr. GREEN. We can show that Mr. Waters's alleged statements to various gentlemen who have testified here have been the basis of their opinions; that all the way through, when the petitioner was putting in its case, its witnesses stated that they understood that the Company got certain prices, and they so understood from Mr. Waters. They said Mr. Waters told them this thing and that thing — a large number of such statements. Now, inasmuch as the petitioner's own witnesses have used Mr. Waters's statements in connection with their testimony, we think that that has made Mr. Waters's statements to our witnesses competent.

The CHAIRMAN. Did you object to their doing it?

Mr. GREEN. Why, we could not object to their doing it. They put in their values, and then on cross examination they

were asked where they got this information and where they obtained their knowledge that the Company was getting certain prices, and they said they got it from Mr. Waters.

The CHAIRMAN. Do you think that is competent evidence?

Mr. GREEN. Which? I do not know which your Honor refers to.

The CHAIRMAN. I do not understand that the declarations of a treasurer of a corporation can be taken as against the company unless it is shown that it is within the line of his duty or action, or that he was authorized to make them for the company.

Mr. GREEN. If the treasurer's statements have been made to the Water Power Company's witnesses and have been used as the basis of the witnesses' statements to this Court, I think that we have a right to use his statements.

Mr. GOULDING. All other statements he has made anywhere else?

The CHAIRMAN. That is ingenious, but I do not believe that will hold water.

Mr. GREEN. What?

The CHAIRMAN. I understand you do not refer to Mr. Waters's statements here in court as a witness.

Mr. GREEN. He has not been a witness: he has been carefully kept out as a witness, we say.

Mr. BROOKS. Well, he has been here. You could put him on.

Mr. GREEN. Yes, a lovely prospect, to put your treasurer on.

Mr. BROOKS. He is within reach of summons; he can be had at any time.

The CHAIRMAN. We are not satisfied at the present time that Mr. Waters's declarations can bind the Company.

Mr. GREEN. Your Honor has no doubt of the fact which I have stated, that various witnesses, Mr. Allen, as I recall for one, and others, cited Mr. Waters as a source of their information?

The CHAIRMAN. Why, upon cross examination, Mr.

Green, they — I will not say what I had in my mind. Upon cross examination these witnesses called by the petitioner have been asked where they got their information, and they said from Mr. Waters. Now, so far as that information goes, you have a perfect right to analyze it. You also have a right to call Mr. Waters yourself, ask him the question — didn't he say so and so to Mr. —, this witness? then put on your witness to contradict him, if you want to. But I never heard of its being claimed that, on the strength of such a statement as yours, the treasurer of a corporation binds the corporation by his declarations.

Mr. GREEN. I will make an offer of proof, and pass on, if your Honor please.

The CHAIRMAN. You have already made an offer of proof.

Mr. GREEN. I did not understand that I had. I asked the witness what he said.

The CHAIRMAN. We exclude that. Why do you want to make an offer of proof? Do you think it is necessary in order to save your rights?

Mr. GREEN. I supposed it was. It is very common in court in the trial of cases to make an offer of proof.

The CHAIRMAN. I did not know but in this case the record would show. Go ahead and make your offer.

Mr. GREEN. We offer to prove that Mr. Waters stated to this witness that the price charged by this Company for non-permanent power was \$600 for non-permanent mill power, and that the instances where it appeared to have charged more were where people were substituting non-permanent power for surplus, and were expected to take up their contracted surplus at surplus rates before they obtained non-permanent power.

The CHAIRMAN. We exclude that, and you except.

Mr. GREEN. We except.

Q. Have you computed for us, Mr. Main, the cost of 500-horse power of steam power, using compound condensing engines with a steady load 10 hours a day, 306 days in a year? A. I have.

Q. And what is the total cost of that per year? A. Per-horse power?

Q. Yes. A. \$20.49 per horse power per year.

By Mr. GOULDING.

Q. 24 hours? A. 10 hours.

By Mr. GREEN.

Q. What do you estimate the plant cost that would produce that horse power? A. \$30,000.

Q. And the fixed charges on the plant would be what? A. \$2,850.

Q. You have figured coal at how much per ton? A. \$4.05.

Q. In arriving at that result, what would be the coal bill? A. \$4,841.

Q. What other items do you include in that? A. Attendance, \$2,094; oil, waste, and supplies, \$375; boiler and fire insurance, \$62.50; carting ashes, \$22; making a total cost for the year, \$10,244.50.

Q. Have you tabulated those results, put them in the form of a schedule? A. I have.

Mr. GREEN. I should like to offer the schedule.

(The schedule entitled Schedule 23 was marked "Ex. 178, F. H. B.")

[EXHIBIT 178.]

SCHEDULE 23.

COST OF 500 H. P. OF STEAM POWER, USING COMPOUND CONDENSING ENGINE WITH A STEADY LOAD, 10 HOURS A DAY AND 306 DAYS A YEAR.

Estimated cost of plant, \$60 a H. P., or \$30,000.

Fixed charges on plant, interest at 5%, depreciation and repairs 3½%,

taxes 1%, total 9½% on \$30,000 \$2,850.00

Coal, $\frac{500 \text{ H. P.} \times 1.75 \text{ lbs.} \times 3,060 \text{ hours}}{2240} = 1,195.3 \text{ tons @ } \4.05 4,841.00

Attendance: 1 engineer @ \$3.00 a day,
1 fireman @ 1.75 a day,
1 fireman @ 1.75 a night,

$\$6.50 \times 306 = \$1,989$

Sundays and holidays $1.75 \times 60 = 105$ 2,094.00

Oil, waste, and supplies 375.00

Boiler and fire insurance 62.50

Carting ashes 22.00

Total cost for year \$10,244.50

Cost per H. P. per year \$20.49

Q. Have you prepared an estimate of the cost of 200 horse power, steam power, using a compound condensing engine with a steady load 10 hours a day, 306 days in a year? A. I have.

Q. What is that cost per horse power per year? A. \$25.32.

Q. What do you estimate that plant would cost? A. \$15,000.

Q. And the fixed charges on that would be how much? A. \$1,425.

Q. Coal? A. \$2,268.

By Mr. BROOKS.

Q. Is this 10 hours? A. 10 hours.

By Mr. GREEN.

Q. Labor? A. \$1,131.

Q. Oil, waste, and supplies? A. \$180.

Q. And what other items have you? A. Boiler and fire insurance, \$50; carting ashes, \$10; making a total yearly cost of \$5,064.

Q. Have you tabulated that in schedule form for easy reference? A. I have.

(Schedule 24 was marked "Ex. 179, F. H. B.")

[EXHIBIT 179.]

SCHEDULE 24.

COST OF 200 H. P. OF STEAM POWER, USING COMPOUND CONDENSING ENGINE WITH A STEADY LOAD, 10 HOURS A DAY AND 306 DAYS A YEAR.

Estimated cost of plant, \$75 a H. P., or \$15,000.

Fixed charges on plant, 9½% of \$15,000 \$1,425.00

Coal, $\frac{200 \text{ H. P.} \times 2.05 \text{ lbs.} \times 3,060 \text{ hours}}{2240 \text{ lbs.}} = 560 \text{ tons @ } \4.05 2,268.00

Attendance, 1 engineer, \$2.50 a day,

* 1 night man, \$1.00 a day,

$\$3.50 \times 306 = \$1,071$

Sundays and holidays, $1.00 \times 60 = 60$ 1,131.00

Oil, waste, and supplies 180.00

Boiler and fire insurance 50.00

Carting ashes, 40 tons at 25c. 10.00

Total yearly cost \$5,064.00

Cost per H. P. per year 25.32

* Could watch also. Have charged only portion of time.

Q. Have you prepared a table, setting out the names of the mills on the first level canal which discharge into the second level? A. I have.

Q. Have you ascertained the water wheel capacity of those mills? A. I have.

Mr. GOULDING. Has he?

Mr. GREEN. He says he has.

Mr. BROOKS. I know; how has he? By hearsay or by an examination?

The WITNESS. Not by an examination.

Q. In what way? A. From the records of the Holyoke Water Power Company.

Q. That were furnished you at their office? A. Furnished me there or here, I have forgotten which now.

Q. Have you also divided the power leased into permanent, day and night power, and non-permanent power? A. I have.

The CHAIRMAN. For those mills.

Mr. GREEN. Of those particular mills, of course.

Q. And where did you obtain that? A. That is all given in evidence, and a schedule is in the case.

Q. And do you also set out in this relative to the same mills the maximum which can be used by each mill at any one time? A. I have.

Mr. BROOKS. How does he get that?

Q. That is a matter of computation, is it? A. Yes.

Q. And also the excess of wheel capacity above the maximum which could be used at any one time? A. Yes.

Q. Have you the schedules or tables that you prepared?

Mr. BROOKS. We shall object to it.

Mr. GREEN. I assumed very likely (producing papers), but I supposed that we should have the same right to put this in as an exhibit or as a table to be referred to as any others for handy reference.

Mr. GOULDING. A sort of *vade mecum*.

The CHAIRMAN. Well, the first question, Mr. Green, is, I suppose, as to the names of the mills on the upper level.

Mr. GREEN. Yes.

The CHAIRMAN. Will you give us that?

Q. Will you give the names on the first level canal that discharge into the second? A. Whiting Company No. 1, D. Mackintosh & Sons Company, Lyman Mills, Whiting Company No. 2, Estate of A. Willard, Prentiss & Company, Beebe & Holbrook Company, Wauregan Paper Company, Whitcomb, Massasoit Paper Company, Merrick No. 2, Skinner Manufacturing Company, Farr Alpaca Company, Massachusetts Screw Company, George R. Dickinson Company, Parsons Paper Company, Linden Paper Company, and then the various plants belonging to the Holyoke Water Power Company.

Q. I notice, in your schedule or table which you desire to introduce, you have opposite the names of these various mills the figures 2, 3, 10, and so on. What do they refer to? A. Those are the numbers that were put on the plan showing the canals and the mills, which was put in as an exhibit.

The CHAIRMAN. In Mr. Gross's evidence.

Mr. BROOKS. Yes.

Mr. MATTHEWS. No, sir, not the plans.

The WITNESS. Put in early in the case.

Mr. MATTHEWS. The plans were put in by Mr. Sickman.

Mr. BROOKS. I think it did not get in until Mr. Gross's testimony. We had supposed it was in, but I don't think it got in.

Mr. GREEN. This is a plan of the manufacturing district opposite page 308 in Vol. VIII.

Mr. MATTHEWS. It got into the case, but didn't get into the printed evidence.

Mr. BROOKS. That is what I mean; it was put in finally by Mr. Gross.

Q. The mills are numbered on the plan, and you use the same number? A. This is a copy, a reproduction, of that same sheet.

The CHAIRMAN. Now put the next question.

The WITNESS. The water wheel capacity —

Mr. BROOKS. Well, we object to it.

The CHAIRMAN. The water wheel capacity. I understand the witness to say it came from the Company's records.

Mr. GREEN. Yes; if they want to have us call for the records—

The CHAIRMAN. Well, we will hear you, Mr. Brooks, on the question of the use of the water.

Mr. BROOKS. If it comes down to a question of evidence, of course it cannot be competent, because the records are the best evidence themselves. He cannot testify to the contents of a record. But I do not mean to object to it on that ground. We should certainly like an opportunity to compare it with the record and see if it is all right. I am perfectly willing it should go in de bene.

The CHAIRMAN. Very well, we will let it go in de bene.

Mr. MATTHEWS. Subject to verification, I suppose.

Mr. BROOKS. Yes; we are not going to take any narrow objection on it.

The CHAIRMAN. State that, Mr. Main.

The WITNESS. Shall I give the name of each mill?

The CHAIRMAN. I suppose you will have to.

Mr. GREEN. Proceed.

The WITNESS. Whiting Company No. 1, 5.91 mill power.

By Mr. GOULDING.

Q. You are stating what? A. The wheel capacity.

By Mr. BROOKS.

Q. Is that .91? A. .91.

Q. That means 5.91 mill powers? A. Yes.

The CHAIRMAN. Wheel capacity.

The WITNESS. No. 3, 7.89. No. 4, 33.49. No. 5, 12.06. No. 6, 1.54. No. 7, 3.87. No. 8, 13. No. 9, 8.25. No. 10, 1.50. No. 11, 7.67. No. 12, 9.26. No. 20, 4.44. No. 21, 9.98. No. 22, 1.92. No. 23, 21.63. No. 24, 12.93. No. 25, 13.39. No. 43 I have not. No. 44, 4.06; and No. 45 I have not. No. 47, 1.15. No. 46, 4.82. No. 48, 10. No. 49, 16.57.

Q. Now will you take No. 2 and tell us the number of permanent powers used in connection therewith, dividing it into day and night and non-permanent if it has any. A. Four permanent day mill powers and three permanent night mill powers. This is all rearranged in the schedules which have been put in evidence.

Q. No. 3. Go right on with them as you did before.

The CHAIRMAN. Perhaps we could facilitate this thing. I would like to make a suggestion. Next is the non-permanent and next the maximum which could be used at one time. Under these conditions is there any objection to this table going in?

Mr. BROOKS. We have no objection to the schedule as a schedule; but we do not, of course—

The CHAIRMAN. I thought it would be a simpler way of putting it in.

Mr. BROOKS. I make no objection to the schedule as a schedule. We do not need to give them the details of this.

Mr. GREEN. Of course, if there is anything, any point you desire to raise about the water wheel capacity, you will let us know, will you not?

Mr. BROOKS. Yes.

Mr. GREEN. So you won't dispute that.

The CHAIRMAN. Then let the table go in, if there is no objection, with the understanding that if you raise any objection to it it will come later.

Mr. BROOKS. Yes, we can do that later. He has got a column 7. I do not understand it. It is my stupidity.

Q. Will you explain it again?

Mr. BROOKS. He has not explained it at all: I have not heard him.

Q. Whether you have or not, will you explain it? A. That is the maximum mill powers which could be used at any one time. For example, on the No. 2 mill there were 4 day mill powers and 3 night mill powers, so that they could not use at one time any more than 4 mill powers.

Mr. BROOKS. I do not gather that in.

The WITNESS. Well, take, for example, No. 4.

Mr. BROOKS. Yes. I do not see how your maximum—

Mr. GOULDING. You mean they haven't any right to use it.

The WITNESS. They haven't any right to use it; that is all they can use.

Mr. GREEN. That is the greatest number they have a right to use at any one time.

By Mr. BROOKS.

Q. But do you take into consideration the surplus? A. No, this simply takes in the leased power.

Q. You do not take into consideration the surplus up to 50 per cent.? A. No.

Mr. BROOKS. This is leased power.

Mr. GREEN. Isn't surplus up to 50 per cent. in all cases leased power?

Mr. BROOKS. I do not know. I cannot say.

Mr. GREEN. We are dealing with the nominally leased.

Mr. BROOKS. Well, I suppose I shouldn't have asked this question. I might have left it to cross examination.

By Mr. GREEN.

Q. The total maximum which could be used at one time is how much? A. 112½ mill powers.

Q. And what is the excess of wheel capacity above that? A. 57.05 mill powers.

By the CHAIRMAN.

Q. That does not include the 50 per cent. surplus, I believe? A. It does not.

By Mr. BROOKS.

Q. It doesn't include any surplus? A. It does not.

By Mr. GREEN.

Q. It includes non-permanent power? A. It includes the leased power, permanent and non-permanent.

By Mr. BROOKS.

Q. And you do not include any of the Holyoke Water Power Company's water in your 112½, I don't understand? A. That is not included.

Q. Have you made any examination of the leases to these various mills, of power? (To Mr. Green.) Can I ask that?

Mr. GREEN. Yes, no objection.

A. None except the George R. Dickinson Company.

(Schedule 25, above referred to, was introduced in evidence and marked "Exhibit 180, W. L. H.")

[EXHIBIT 180.]

SCHEDULE 25.

MILLS ON FIRST LEVEL DISCHARGING INTO SECOND.

Column 1	2	3	4	5	6	7	8
MILLS.	No.	Water wheel capacity.	POWER LEASED.			Maximum which could be used at one time.	Excess of wheel capacity above Col. 7.
			Permanent.		Non-permanent. Hours.		
			Day. M. P.	Night.			
Whiting Company, No. 1 .	2	5.91	4	3	—	4	1.91
D. Mackintosh & Sons Company	3	7.89	—	—	4-16	4	3.89
Lyman Mills	4	33.49	21½	—	5-12	26½	6.99
Whiting Company, No. 2 .	5	12.06	5½	4½	—	3½	6.56
Estate of A. Willard . .	6	1.54	1	—	—	1	.54
Prentiss & Co.	7	3.87	2	—	—	2	1.87
Beebe & Holbrooke Company	8	13.00	4½	3½	—	4½	8.75
Wauregan Paper Company	9	8.25	5	5	—	5	3.25
Whitcomb	10	1.50	1	—	—	1	.50
Massasoit Paper Company	11	7.67	4	4	—	4	3.67
Merrick, No. 2	12	9.26	8	—	—	8	1.26
W. Skinner Manufacturing Company	20	4.44	1½	—	—	1½	2.94
Farr Alpaca Company . .	21	9.98	6	—	—	6	3.98
Mass. Screw Company . .	22	1.92	1	—	—	1	.92
Geo. R. Dickenson Com- pany	23	21.63	—	9	{ 6-16 6-24	15	6.63
Parson Paper Company . .	24	12.93	—	—	14-24	14	0
Linden Paper Company . .	25	13.39	—	—	10-24	10	3.39
H. W. P. Company	43						
" " " "	44	4.06	3½				
" " " "	45						
" " " "	47	1.15	1				
" " " "	46	4.82	2				
Cabot Street Mill	48	10.00	10				
Electric Light Plant . . .	49	16.57	—	—	12-24		
						112½	57.05

By Mr. GREEN.

Q. Did you make a test in connection with Dr. Bell and some gentlemen representing the Company, I think Professor Robb and Mr. Whitham, in behalf of the Water Power Company, of the engines and wheels at the electric light station?
A. I assisted in making those tests.

Q. And did you preserve your work? A. I did.

Q. When was that test made? A. On Sunday, Dec. 23, 1900.

Q. Can you tell us briefly what was done and give us the result of the tests, what they showed?

Mr. BROOKS. Wasn't that the 24th? I thought it was the day before Christmas.

The WITNESS. I am not sure. We made two series of tests. The first series was made with the engines, and the purpose of those tests was to ascertain, first, the friction load on the engine, that is, the amount of power that was required to drive the engine with no load except the belt which drove onto the receiving pulley on the line shaft.

The CHAIRMAN. Cannot he put that into the shape of a schedule?

Mr. GREEN. I don't know,—if there is no objection.

The CHAIRMAN. Is there any objection, Mr. Brooks?

Mr. GREEN. I think it would be a great deal shorter to let the witness testify than it is to wrangle over a schedule.

Mr. BROOKS. Nobody is wrangling over any schedule.

The CHAIRMAN. Well, let us put in this schedule, if both sides agree to it.

Mr. BROOKS. If you will let us see it, probably we will agree to it.

The CHAIRMAN. Is there any objection to its going in?

Mr. BROOKS. So far as I can see, there is none.

The CHAIRMAN. What does it all amount to, anyway?

Mr. GREEN. What I wanted to get at was, what was the purpose of the test and what was the result of the test.

The WITNESS. The purpose of the first series of tests was to ascertain how much power it took to run the engines and the shafting under the various conditions under which the

station is run, with light loads and medium loads and heavy loads; and the second series of tests was made to ascertain the same thing when running with the wheels.

Q. Now, will you state in a general way the process by which you got at that?

The CHAIRMAN. Will there be any question about the process and methods?

Mr. GREEN. I don't know. I don't care to ask it if there is to be none. I imagine there might possibly be.

The WITNESS. The first thing to ascertain was —

The CHAIRMAN. We do not want to go into a long account of how they tested an engine. What good will that do? How much power did he get out of this engine?

Mr. GREEN. If your Honor please, what I desire to get is this, first of all: Did you ascertain how much power it took to run the shafting alone from the engine?

The CHAIRMAN. That is right, Mr. Green.

The WITNESS. That can be ascertained from the figures which are given in this table.

The CHAIRMAN. How about your last page, page 4?

The WITNESS. That includes the engine and the shafting each time.

Mr. GREEN. Then I should re-form my question.

Q. I will ask how much power it takes to run the engine and the shafting without any load? A. That we ascertained by running both engines, first one and then the other, and the average of the first series of tests was 39.26 horse power on Engine A, and 40.36 horse power on Engine B.

By the CHAIRMAN.

Q. What does that mean? A. That means it took about 40 horse power to run one engine and the belt on the engine and the receiving pulley on the line shaft, without running any more shafting.

By Mr. GREEN.

Q. Then, running the driving shaft which runs the day load, how much power did it take on the two engines? A. In making that test we used only Engine A, and found it took 65.03 horse power for an average.

Q. When you speak of the driving shafting, that means with the shafting that is in the basement, the main line and shafting? A. That was driving the shafting which runs the day load.

Q. On the 4th page of this schedule what does "2b" represent? A. "2b" is Engine A, driving the shafting which runs the day, the commercial and incandescent shafting. That is an additional amount of shafting.

Q. But no load on, of course, in any case? A. No load.

Q. How much is that? A. 82.35 horse power.

Q. Were the belts to the dynamos on in any case? A. They were not.

Q. Whether or not they would add any perceptible friction if they were on? A. They would add, I should say, about 2 per cent.

Q. What does "2c" represent? A. "2c" represents the load on Engine A driving the day shafting, and that which is used for running commercial, incandescent, and arc lights.

Q. And how about what is meant by 2b? Explain what that is. A. In the test 2b we ran both engines, driving the same shafting as was used in 2c. That is all the shafting which is used with a full load.

Q. Belts, as I understand it, were on none of the pulleys onto the dynamos in building? A. Not in any test.

Q. Which of these, if any, is the regular full load condition? A. I understand that when the maximum load is on that both engines are run, and 2d would represent the friction load under those conditions.

Q. Will you state what you ascertained in regard to the wheels? A. We first ran No. 2, or C wheel, with the day load shafting, and found that it took 13 horse power.

Q. Running, you say, the day load shafting. And wheel No. 1? A. Then we ran Wheel No. 1, or Wheel A, running the shafting up to the first clutch in the shafting, and with one belt driving across. That took 18 horse power.

Q. Then how did you run the wheels? A. Then we ran Wheels 1 and 3, or A and B, with the incandescent or commercial shafting, and obtained a result of 52 horse power. Then

we ran Wheel No. 3, or B, with all the shafting which is run with the maximum load, and that took 51 horse power.

Q. Do the last two conditions that you examined represent actual running conditions? A. They do not.

Q. Why? A. During times of ordinary four-night lighting at least three wheels run, and sometimes four, and during the time of the maximum load four wheels are run.

Q. What difference does that make, if any, in your opinion? A. It would increase these powers shown in the last two tests.

Q. By about how much would it increase them, in your opinion? A. I haven't figured that out.

Q. Will you consider that, then? I thought you had it computed. A. I will.

Mr. GREEN. I offer the schedule. I don't know that I have asked questions enough about the schedule, about the card, and the revolutions, and so on.

(Schedule 26 put in evidence, and marked Exhibit 181.)

[EXHIBIT 181.]

SCHEDULE 26.

FRICION TESTS, SUNDAY, DEC. 23, 1900.

TESTS ON ENGINES.

<i>Conditions.</i>	<i>No. of Cards.</i>	<i>Time.</i>	<i>Actual average revolutions.</i>	<i>Horse power at 75 revolutions.</i>
1a. Engine A, no load except belt and receiving pulley.	4 6 8 10	10 to 10-20	75	40.50 38.93 40.11 37.49
Average	—	—	—	39.26
1b. Engine B, no load except belt and receiving pulley.	12 14 16 18	10-48 to 10-58	75.4	35.22 42.66 49.33 36.23
Average	—	—	—	40.36
2a. Engine A, driving shafting which runs the day load.	20 23 24	11-15 to 11-25	75.6	65.06 66.33 63.71
Average	—	—	—	65.03
2b. Engine A, driving day, commercial and incandescent shafting.	27 29 31 33	11-40 to 11-50	74.1	87.33 80.88 86.78 74.43
Average	—	—	—	82.35
2c. Engine A, all shafting except wheel shafts, end of line formerly used for street railway and two intermediate lines.	35 37 39 41	12-08 to 12-18	74.2	87.41 87.05 84.52 85.98
Average	—	—	—	86.24
2d. Both engines, same shafting as in 2c.	43A 45A 46A 47A	12-47 to 12-53	72½	74.77 60.42 56.58 62.33
Average	—	—	—	63.52
	44 45B 47	12-48 to 12-54		46.13 59.52 45.17
Average	—	—	—	50.17
Total friction load with two engines				113.69

NOTE.—In figuring the horse power, the speed of the engines has been considered as normal, or 75 revolutions in each case.

TEST OF WHEELS.

<i>Conditions.</i>	<i>Test No.</i>	<i>Time.</i>	<i>Level of first canal.</i>	<i>Level of second canal.</i>	<i>Gross head feet.</i>
Day load shafting, wheel No. 2 or C .	2	2-25	100.1	79.5	20.6
Wheel No. 1, or A, with shafting to 1st clutch and cross-drive to 1st clutch,	1	2-42	99.93	79.64	20.29
Wheels 1 and 3, or A and B, with incandescent and commercial shafting,	3	3-00	99.8	79.75	20.05
Total	—	—	—	—	—
Wheel 3, or B, with all shafting running with maximum load	4	3-22	99.7	79.75	19.95

<i>Conditions.</i>	<i>Net head feet.</i>	<i>Inches of gate opening.</i>		<i>Degrees of gate.</i>	<i>Rev. of shaft.</i>	<i>Horse power.</i>
		<i>By scales.</i>	<i>From diagram.</i>			
Day load shafting, wheel No. 2 or C .	20.5	3 1/8	3 1/2	62	174-178	13
Wheel No. 1, or A, with shafting to 1st clutch and cross-drive to 1st clutch,	20.2	2 1/2	3 1/2	67 1/2	298	18
Wheels 1 and 3, or A and B, with incandescent and commercial shafting,	19.95	{ A 4 B 4 1/2	{ 3.72 4.00	{ 72 71	{ 178 to 184	{ 23 29
Total	—	—	—	—	—	52
Wheel 3, or B, with all shafting running with maximum load	19.85	5 1/2	5.4	89	176	51

NOTE.—Normal speed of wheel shafts 176 and of outside lines 300 revolutions.

No test was made with all shafting run and all wheels, as is customary, with full load, on account of lack of time.

SUMMARY OF TESTS AND NOTES ON SAME.

ENGINES.

<i>Conditions.</i>	<i>Indicated H.P.</i>
1a. Engine A, no load except belt and receiving pulley	39.26
1b. " B, no load except belt and receiving pulley	39.93
2a. " A, driving shafting which runs day load	65.03
2b. " A, driving day, commercial and incandescent shafting	82.35
2c. " A, driving day, commercial, incandescent, and arc shafting	86.24
2d. " A and B, same shafting as in 2c	113.69

WHEELS.

<i>Conditions.</i>	<i>H. P. on wheel shaft.</i>
Wheel No. 2, or C, running day load shafting	13.00
Wheel No. 1, or A, running with shafting to first clutch and cross-drive,	18.00
Wheels 1 and 3, or A and B, with incandescent and commercial shafting,	52.00
Wheel No. 3, or B, with all shafting run as with maximum load	51.00

NOTE.—The two last conditions do not represent the actual running conditions. During the times of ordinary four-night lighting at least three wheels are run and sometimes four wheels. During the times of maximum load all four wheels are run.

All of the above tests were made with the belts which drive the dynamos from the line shafts not running. There is an additional loss here.

The CHAIRMAN. Do you agree to this, Mr. Brooks?

Mr. BROOKS. No, your Honor, I don't.

The CHAIRMAN. Mr. Turner, do you understand this?

Mr. TURNER. I haven't seen it.

Q. I notice on the first page of your schedule the "Number of card." What is that? A. That is simply the number placed on the indicator card as it was taken from the engine. Each indicator card, as taken from the engine, was given a number for reference.

Q. Then under the column of "Time" you have 10.48, 10.58. Is that the time of day by the clock? A. Yes, that is the time, the period during which these indicator cards were taken.

Q. Then you have a column "Average revolutions." What is that taken from? A. That is the average revolutions of the engine during that period.

Q. And in the next column the horse power at those revolutions? A. Reduced to 75 revolutions.

By Mr. GOULDING.

Q. Per minute? A. Per minute.

By Mr. GREEN.

Q. On pages 2 and 3 of your schedule you have in the first column "Conditions." I think that refers to the shafting that is being run? A. It does; to the shafting and wheels.

Q. What do you mean by "Test No." in the first column? A. We agreed to number these tests 1, 2, 3, 4, and so on.

Q. Who is "we"? A. Mr. Allen and myself.

Mr. BROOKS. I agree to that.

Q. The next column, "Level of first canal," "Level of second canal." That, I suppose, speaks for itself. Is there anything there that is necessary to be understood? What is the 100.1, for instance? A. That is the level of the water in the first canal, shown by the gauge of the Holyoke Water Power Company.

Q. And the next is the "Gross head, feet," and "Net head, feet." What is the difference? A. That is the difference between the level of the water in the first canal and in the second canal.

Q. And this is the level of water in the first canal? A. The level of water in the first canal is 100.1. The level of water in the second canal is 79.5, the difference being 20.6, which represents the gross head.

Q. From what do you get the net head feet, or what does that have to do with it? A. There is some loss in getting the water on to the wheel and away from the wheel. Mr. Allen and I agreed as to what allowance we should make for that.

Q. Then the net head feet and gross head feet was a matter of agreement? A. The gross head is taken from actual readings. The allowance for the loss is a matter of agreement.

Q. You have two columns under the general head of inches of gate opening, first by scales and second by diagram. What are the scales? A. Those scales are scales which are located in the dynamo building of the electric light station, near the wheels which open and shut the gates and the water wheels, and which are supposed to show, and do show approximately, the gate opening in inches.

Q. Is the diagram the one introduced in evidence here? A. It is.

Q. Degrees of gate. Does that refer to the dial? A. That refers to the dial, which is fastened to the gate opening mechanism of the wheel. It shows the opening in degrees.

Q. Then you have a column of revolution of shaft. Is that the driving shaft, vertical shaft? A. That is the shaft in the basement. Sometimes the speed is taken on one shaft, and sometimes on another.

Q. And the horse power in the final column is the horse power on the shaft? A. It is the horse power on the wheel shaft.

Q. Running with various loads set out in the column of conditions? A. It is.

Q. Was any test made with all the shaftings run in all the wheels, as they would be run with a full load? A. No test was made.

Q. What was the reason for that?

Mr. BROOKS. Well!

The CHAIRMAN. It is a fact that it was not made, Mr. Green?

Mr. GREEN. It was not.

Q. How long were you engaged in making these tests?

A. We started in the morning at 10 o'clock, and worked almost continuously until it was time to put the station into regular service.

By Mr. BROOKS.

Q. Without eating? A. We took a few minutes' intermission for lunch.

By the CHAIRMAN.

Q. You didn't carry a load at all, except the shafting? A. No, sir; there was no load.

By Mr. GREEN.

Q. Now, Mr. Main, turning to page 61, assuming there is 41,289 square feet of land offered, of which 28,000 square feet could be built on, and considering the shape of it as shown on the plan submitted, whether or not, in your opinion, 16 mill power of water could be utilized in connection with this land for any other purpose than an electric light station?

Mr. BROOKS. I object to the question, and my objection is to his qualification, expressly.

The CHAIRMAN. There has been evidence offered, on one side or the other, that 16 mill power would be too much for the land, excepting for electric light purposes, as I understand it.

Mr. BROOKS. I don't know of any such testimony, your Honor, that has been put in. It has been talked about, but I don't know whether it got into the testimony or not.

The CHAIRMAN. It may be it was in some discussion. Mr. Green, do you think this gentleman, going up there and making this examination, is qualified to pass upon that question, a question purely within the limits of mill men? They know the capacity they desire, the necessity of the size of the buildings, etc., and he doesn't. How can he any more than I could?

Mr. GREEN. I should suppose that a man who has had as much experience as Mr. Main has with various mills in this

country, regarding the powers used in such mills, who has seen them, and knows how much land they occupy, could express a very helpful opinion to this Commission, as to whether there was any reasonable probability that that number of mill power could be used in connection with a lot of land of this size and shape. I assume that a lawyer whose practice leads him to a knowledge of mills would probably have a better opinion in that connection than the average man, perhaps. But I submit that a man who has had as much experience as it has been disclosed Mr. Main has had must have more knowledge, and should be allowed to give his testimony.

The CHAIRMAN. Do you mean to say if I see a mill covering a hundred thousand square feet I can tell how much power is necessary to run that mill?

Mr. GREEN. I don't think you could, but if you knew of a cotton mill,—if your experience had shown you how much power was used in connection with the Lyman Mills, for instance, or the Skinner Silk Mills, or the mills of Lowell and Lawrence, and if you knew the area of land necessary for one of those mills, or for paper mills, say, it seems to me you could express some opinion.

The CHAIRMAN. We are in trouble here. Mr. Turner thinks it depends entirely on the purpose, and Mr. Cotter says he thinks it ought to be admitted. I don't see how much benefit we are going to get out of it. If you wish to discuss it we will hear you. Do you think it necessary to show this by this witness, who certainly hasn't greater qualifications than most men to pass on this question, when you can call plenty of people from Holyoke?

Mr. GREEN. Yes; we can call plenty, and we probably shall call some. But it seemed to me that Mr. Main's experience had been quite wide and large. He knows something about paper mills, and knows about the power used in connection with several; he has estimated for steam plants, and run them; he has some knowledge obviously of the area occupied. There has been evidence in this case showing the mill power in mills in Holyoke which he has looked over. He is familiar with cotton mills and with various other mills using power, and

his answer would go as far as his opinion would carry weight with the Commission. I don't know that anybody can say that some other industry might not be put there. But, in the ordinary probabilities, can we expect a sale of this land, supposing the City gets it, and for some reason wants to sell it?

The CHAIRMAN. Let the people who know up there testify. You can't qualify an engineer for everything. That is my view, and you will have to convince Mr. Turner.

Mr. MATTHEWS. Would your Honor care to reserve the question until to-morrow morning?

Mr. GOULDING. I do not see why it is not entirely clear what the area is that is before the Commission. I do not see why anybody wants to testify here that you cannot put up a mill as many stories as you have a mind to, or why we should let him testify to that, in view of the fact that buildings have been built and power used in buildings of various numbers of stories in cities, and in high stories. I rise to submit that it is not a question of expert evidence. We have got the area, and have got the shape, and it is perfectly clear that you cannot build any bigger mill on it, on that land. I submit it is not evidence, and when they call their experts or neighbors over here we shall make a strenuous objection. It is not a matter for evidence at all.

Mr. MATTHEWS. It seems to me, if your Honors please, that the real question is concerning the mechanical possibility of utilizing a certain quantity of water power upon a given area of land; or, to put it somewhat differently, What is the maximum amount of water power that can be practically and mechanically utilized and availed of in any building that might be erected of reasonable dimensions upon a given area of land? Now, why is not that necessarily a question for an expert to pass upon? It is true, of course, that business men may also have qualifications, just as business men, owners of real estate, are permitted to testify in cases involving the valuation of land, although they do not profess to be real estate brokers or agents. But I never heard a real estate expert shut out of real estate valuation cases on the ground that owners and business men might have equal knowledge with his, or

even greater. It seems to me that it is peculiarly within the province of an expert with the wide experience Mr. Main possesses to instruct the Commission as to how much power can practically and mechanically be availed of in any such building as could reasonably be erected upon a given area of land. I might suggest some alternative questions. For instance, these:

"How many mill power could be utilized on 41,000 square feet of land for any purpose other than the manufacture of electric light and power?"

Or again:—

"What is the fair market value of 16 non-permanent mill power to be used in connection with or as appurtenant to 41,000 square feet of land for any other purpose than the manufacture of electric light and power?"

This whole line of questioning which Mr. Green is now pressing is material only, of course, in the event that it should become necessary for the Commission to determine whether the water privilege and power that are under discussion in this case have any higher value for any purpose than for the manufacture of the electric current for use in lighting and for power purposes.

The CHAIRMAN. I will suggest that you read those three questions over again that you have just recited.

Mr. MATTHEWS. I suggested two questions, your Honor, not three. The first was this:

"How many mill power could be utilized on 41,000 square feet of land for any purpose other than the manufacture of electric light and power?"

Second, "What is the fair market value of 16 non-permanent mill power,"—of the amount offered to us by the Company,— "to be used in connection with or as appurtenant to 41,000 square feet of land for any other purpose than the manufacture of electric light and power?"

And that question might, of course, be varied by substituting, in lieu of 16 non-permanent mill power, 8 non-permanent mill power. I would want to have that question put in, too.

Mr. GOULDING. We claim that this witness—

Mr. MATTHEWS. Pardon me a moment, Mr. Goulding.

Those questions might also be refined, as my associate suggests, by incorporating in them the fact, if it be a fact, that only 28,000 square feet of the 41,000 is available for building, and that the lot is of irregular and not rectangular shape.

Mr. GOULDING. We claim that this witness is not qualified to answer any such questions as Mr. Matthews has suggested. He certainly is not a universal genius. He does not know all there is to know of all the businesses there are in the world: there is some limit to his knowledge. I will admit that he may be beyond my horizon and ken, but I say, on general principles, there must be some limit to his knowledge, and he cannot get up here and say, "I am the universal oracle, and I can tell you all about all sorts of businesses, and how they stand related to a piece of land in Holyoke."

Mr. MATTHEWS. We would like to coincide with Brother Goulding's information, that there are very few people who know more about water power in its various manifestations and uses than the man who now occupies the witness stand.

Mr. BROOKS. I have not heard any such information. You are gathering figs from thistles.

The CHAIRMAN. The way you would like it, Mr. Matthews, you would like to leave it like this: Mr. Main and myself are travelling along in the cars, and we come to a town and we look out the window. We stay there; the train may have run off the track; that, perhaps, gives us all the better opportunity. Mr. Main walks up and down the street with me, and he says, "There is a building; that lot can stand about so much power." The iron industry is going on in the town. The iron industry goes out of existence; paper mills come into the same town. Mr. Main goes with me again next year, and says, "There, that is the amount of power that land can stand." How much benefit am I going to get out of Mr. Main's judgment on that question, any more than yours?

Mr. MATTHEWS. I would like to ask, if your Honor looks at the question in that way, how your Honor would derive any instruction from the statement of anybody on that question?

The CHAIRMAN. That may be a fair answer, but —

Mr. MATTHEWS. Suppose, instead of putting Mr. Main into the cars travelling in company with your Honor, you should put any of these merchants in Holyoke ; it seems to me that their qualifications, while they may exist to a sufficient extent to enable them to take the witness stand on such a question, are less than those possessed by this witness on any question relating to the use of water power for manufacturing purposes. But I should like to differ somewhat with your Honor as to the aspect in which the question presents itself. It is not the opinion of this witness, or of any other witness that we might produce, as to what could be done in a particular building. There is no particular building to value, so far as this question goes. The question is rather, as it seems to me, this : How much power could, in the abstract and at the maximum, be availed of in any building that mechanical ingenuity could construct upon a lot of a given size and shape ? In other words, it is an abstract, theoretical, engineering proposition. There are limits, of course, to the height to which you can run buildings. You cannot run a building 500 feet in the air. If you did it would be excluded from the limitations surrounding this subject that were put into my question, restricting it to what is reasonable and practical from a mechanical standpoint. Now, no one has had more experience than this witness in the construction of mills of all kinds ; that is his business ; and he, at least, ought to be competent to say how much power could be utilized upon land of given area and shape in any kind of a building that could be erected. We want to put that evidence in for the purpose of showing that only about 4 mill power could be used with this 41,000 feet of land, and to contend that, if this water power and privilege is to be valued at its value for any purpose other than that of manufacturing electricity for light and power, its value must be limited to the number of mill power, not exceeding, we will say, four, which can practically and mechanically be utilized upon this 41,000 feet of land. We can produce a lot of gentlemen from Holyoke, but what could they say ? How, may it please your Honor, are their qualifications superior to Mr. Main's ? How, in fact, do they equal his ? They would probably, one and all, have to

rely upon their experience, more or less limited, with the class of buildings that are, in fact, erected for mill purposes in Holyoke.

The CHAIRMAN. That is what they ought to rely on.

Mr. MATTHEWS. Why, no, because perhaps mechanical engineers could suggest some form of structure in which a greater amount of power could be utilized. If we confined ourselves to the facts of the case as they appear in Holyoke, to the actual practice, we need not go beyond the facts that are already in evidence, namely, that the ratio of area to mill power is 16,000 square feet of land to 1 mill power. We need not go beyond that. But would not the other side reply with some force: "That may be the practice in the city of Holyoke, but that practice does not necessarily represent the limits or the possibilities of the case, and although, as a matter of fact, they may not use more than 4 mill power upon 41,000 feet of land in Holyoke, as buildings are built here to-day, *non constat* that engineering and constructional skill could not devise a building in which you could utilize 5 or 6 or even 8 or 10 mill powers." It is to cover that contention that we solicit the testimony of a person skilled in the construction of mills and in the practical utilization of water power. We can also, of course, resort to our Holyoke merchants at a later stage of the case.

(The stenographer read the question put by Mr. Green.)

"Now, Mr. Main, turning to page 61, assuming that there is 41,289 square feet of land offered, of which 28,000 square feet could be built on, and considering the shape of it as shown on the plan submitted, whether or not, in your opinion, 16 mill power of water could be utilized in connection with this land for any other purpose than an electric light station?"

(The question was admitted and the petitioner excepted.)

A. I think it could not.

Q. How many mill power, in your opinion, could reasonably be expected to be utilized in connection with this particular land?

Mr. BROOKS. If that is going in—

A. Not over 4 or 5 mill powers.

Mr. COTTER. By "expected" I suppose you mean in his opinion?

Mr. GREEN. Yes.

Mr. GOULDING. That is admitted, is it?

The CHAIRMAN. Yes.

Mr. BROOKS. Our exception is saved, I understand.

The CHAIRMAN. Does that close that topic?

Mr. MATTHEWS. One moment, if your Honor please.
(Conferring with Mr. Green.)

Mr. GREEN. That is all on that subject, if your Honor please, that particular subject. We have only two or three more questions to ask this witness, but we can ask those in the morning. It will take only a few minutes.

(Adjourned to Thursday, March 14, 1901, at 9.30 A.M.)

FIFTY-EIGHTH HEARING.

Springfield, Thursday, March 14, 1901.

The Commissioners met at the Court House at 9.30 A.M.

CHARLES T. MAIN, *resumed.*

Direct Examination by Mr. GREEN, continued.

Q. Mr. Main, have you made some computations showing the cost of power at the switchboard in Holyoke per horse power hour on the various assumptions that you made of \$72,000 bonus and \$24,000 rent, and so on? A. I have.

Q. Will you give us the result of your computations? tell us first the assumption as to bonus and rent. A. Referring to Schedule 13, the assumption of \$72,000 bonus and \$1,500 a year for 16 mill powers, the cost per horse power hour at the switchboard would be 3 cents. Schedule 14, \$72,000 bonus and \$1,500 for 8 mill powers, 1.93 cents. Schedule 15, \$36,000 bonus and \$1,500 for 8 mill powers, 1.756 cents. Schedule 16, \$72,000 bonus and \$1,500 for 3.36 mill powers, 1.309 cents. \$50,000 bonus and \$1,500 for 3.36 mill powers —

By Mr. BROOKS.

Q. Is that Schedule 17? A. No, I think it will be found at the end, perhaps. I am not sure.

Mr. GREEN. Measured water.

The WITNESS. 1.202 cents.

By Mr. GREEN.

Q. Under your last proposition of \$50,000 bonus and 3.36 mill power at \$1,500, it is measured water? A. It is.

Q. Now have you made a computation reducing Mr. Anderson's figures as given by him of the cost of power per mill power to horse power hours at the switchboard? A. I have.

Q. Will you give us that computation, the result of it?

Mr. BROOKS. We object to it.

The CHAIRMAN. Where is that — Springfield?

Mr. GREEN. Yes, it is simply taking Mr. Anderson's own statement that the water, as given by him in direct evidence, costs so much; it is reducing it to horse power hours at the switchboard, not adding any figures or taking away any figures. I suppose it is a mathematical computation that any competent witness can make.

The CHAIRMAN. If we can do it, Mr. Green, we should prefer to do it.

Mr. MATTHEWS. If your Honor please, how does anybody know how to do it? We do not know.

The CHAIRMAN. Then go ahead, if that is so.

Mr. BROOKS. I understand really that none of this is competent, because he has not shown any knowledge of electrical efficiency, and I am informed that is necessary in order to arrive at these conclusions. We should, perhaps, have objected to the first, but we did not care anything about it —

The CHAIRMAN. On your assurance, Mr. Matthews, that we cannot do it without his assistance, we think it had better be admitted. (To Mr. Brooks.) We will save your rights.

Mr. MATTHEWS. I wish to say that if it was left to argument I should produce one figure. Mr. Goulding, perhaps, would produce another. It is not a mere question of addition, subtraction, or division, however. It involves some technical knowledge on the subject before it can be done.

Mr. GOULDING. We desire to save our exceptions.

The CHAIRMAN. Certainly.

Mr. GOULDING. To the general comparison of cost in one place with cost in another under entirely different conditions.

The CHAIRMAN. Very well.

A. At Springfield, at the first switchboard, 0.457 cent. Springfield, at the second switchboard, 0.538 cent.

Q. Have you put the results as stated by you in the form of a schedule? A. I have.

Q. And in addition to the figures therein given, have you placed in it the figure given by Professor Robb as being the cost of water power at the switchboard at Hartford? **A.** I have.

Mr. BROOKS. This is all under our exception.

The CHAIRMAN. What was that question?

Mr. GREEN. I asked the witness in substance, if your Honor please, if he had put in a schedule form these computations for ease in reference, and if he had added to it the figure of 0.49 cent, cost at the switchboard as stated by Professor Robb at Hartford. And I should like to offer that, to have it printed for ease in reference later.

The CHAIRMAN. Mr. Brooks, do you object to it?

Mr. BROOKS. Yes, sir.

The CHAIRMAN. Do you object to the schedule as a schedule?

Mr. BROOKS. No, sir.

The CHAIRMAN. Why not put it in in that shape? We admit it, subject to your objection.

(The schedule was marked "Exhibit 182, F. H. B.," being as follows:—)

[EXHIBIT 182.]

TABLE SHOWING THE COST PER H. P. HOUR AT SWITCHBOARD IN HOLYOKE UNDER VARIOUS PROPOSITIONS.

<i>Schedule No.</i>	<i>Proposition.</i>	<i>Cost per H. P. hour.</i> <i>Cents.</i>
13	\$72,000 bonus and \$1,500 for 16 M. P.	3.000
14	\$72,000 " " \$1,500 " 8 "	1.930
15	\$36,000 " " \$1,500 " 8 "	1.756
16	\$72,000 " " \$1,500 " 3.36 "	1.309
	\$50,000 " " \$1,500 " 3.36 "	1.202
	Springfield at first switchboard	0.457
	Springfield at second switchboard	0.538
	Hartford	0.490

Q. Speaking, Mr. Main, in the language of a hydraulic engineer, to what class of power does this non-permanent power belong?

Mr. BROOKS. Wait a minute. We object to that question.

Q. In Holyoke.

The CHAIRMAN. Oh, that describes itself, Mr. Green. We know what non-permanent power is.

Mr. MATTHEWS. If your Honors take the statement of witnesses on the other side uncontradicted, your Honors might reach a different conclusion from that which we should argue to be a correct one.

The CHAIRMAN. Do you expect to contradict that statement?

Mr. MATTHEWS. I understand there is a conflict of evidence, yes, sir.

The CHAIRMAN. We admit it subject to objection.

A. It belongs to the surplus.

Q. Are you familiar with places in Massachusetts where surplus power, day and night power, of the same general class that this is, is sold?

Mr. BROOKS. Wait a minute. We object to that.

The CHAIRMAN. To that you can answer yes or no.

Mr. BROOKS. Yes. We do not object to that.

A. Yes.

Q. Will you mention the places?

Mr. BROOKS. That we object to.

The CHAIRMAN. All right. Answer.

A. Lawrence and Lowell.

Mr. BROOKS. We except to it.

Q. Can you tell us the price at which this power is sold in Lowell, for instance?

The CHAIRMAN. Let him answer that yes or no.

A. Yes.

Q. Now at what price?

Mr. BROOKS. Now we want to be heard on that.

The CHAIRMAN. Establish the similarity, and then we will perhaps let him testify.

Q. Will you tell us about the power, taking up Lowell first of all, and telling wherein you think it is similar? A. The charge for surplus power at Lowell is \$3 a day —

Mr. BROOKS. We object to that.

Q. The question I asked was to describe the power, showing the points of similarity, as you understand. A. As I understand it, at Lowell, at Lawrence, and Holyoke, a certain amount of permanent power has been sold which can be furnished almost every day of every year. Above that the power which is used in all of these places is surplus; and in all three of these places, with the exception of the non-permanent power at Holyoke, which is indentured, this surplus power is sold without being paid for in the gross, but for the amount as it is used. In each place, as I understand it —

Mr. BROOKS. Well, I don't understand he is answering the question.

Q. What is the last of your answer? I didn't get it. A. I have not finished. In each place, as I understand it, the use —

Mr. COTTER. Each place — you mean Lowell and Lawrence?

The WITNESS. And Holyoke. The use of the surplus can be discontinued by either party on a limited notice.

Q. Taking Lowell, for instance, is there a 50 per cent. surplus there recognized in addition to the permanent power?

Mr. GOULDING. If there is it must be by deed or some instrument. This witness cannot put in his construction of some instrument he has seen.

Mr. MATTHEWS. Exactly the same sort of question has been answered by the other side.

Mr. COTTER. Why isn't that so, Mr. Green? Isn't there in all probability some record evidence of that?

Mr. GREEN. I don't know whether there is or not. There may be and may not be. I don't know. The Court was not disposed in one or two instances to hold the other side very closely to the contents of a written instrument. I remember one discussion when Samuel Green was on as to what was paid by the Street Railway Company in Holyoke for power; and he

was allowed to state what it was, although there was a written contract. I do not remember what your Honors' grounds were, but it was allowed — for convenience, ease, or something.

The CHAIRMAN. On the ground you didn't object, probably.

Mr. GREEN. Well, we did object most strenuously, if your Honors please.

The CHAIRMAN. Find that, please, and see whether you did or not.

Mr. MATTHEWS. I would like to cite a few instances fully as much in point as the ones my associate mentions. Almost all the water experts for the Company were asked to describe the different classes of power, substantially as Mr. Green is asking this witness to do; and they were permitted to do so under objection. I remember objecting distinctly to three or four statements of that sort which were asked,—I will undertake to find them if I may have sufficient time,—and my objection was overruled. As I understand it, the ground the Commission took was this: The witness is not asked to state the contents of a written instrument, but to state what he understood to be the practice in Holyoke with respect to the different classes of power, or the manner in which the water in the canals was used. Now we are simply asking for the same privilege that was accorded to the other side, and we shall be willing, I think, to have this testimony go in, *i.e.*, this particular question, subject to our being able to produce the instances in which similar evidence was admitted from the other side against our objection.

Mr. GOULDING. I don't know what effect will be given to this argument. I am not aware that this Board has departed very much from the ordinary rules of evidence, except in cases where it was agreed at the time that it might be so.

Mr. COTTER. We didn't intend to.

Mr. MATTHEWS. I haven't said so.

The CHAIRMAN. I think the fundamental principle is the written instrument.

Mr. COTTER. Don't you believe, gentlemen, Mr. Matthews and Mr. Green, that in a business enterprise like this,

for instance, that there is in all probability a written instrument?

Mr. MATTHEWS. Undoubtedly, in all cases.

Mr. COTTER. That being the case, your belief and our belief, and this objection having been raised—

Mr. MATTHEWS. Your Honor is stating practically the same objection that I made to the introduction of similar evidence by the other side. I was overruled, and I ask to have it overruled now. I am willing to have this answer go out if I cannot produce proof at the next hearing that some of the questions were admitted. I mean questions relating to the same state of facts.

Mr. COTTER. That you objected to on the ground that there was a written instrument?

Mr. MATTHEWS. Yes, sir; on that distinct ground.

The CHAIRMAN. If it was objected to, I should have allowed that, in describing the characteristics of the different powers in Holyoke.

Mr. MATTHEWS. I don't think we took any exception. We simply made an objection, and the evidence was admitted. Your Honors will recollect, perhaps, as to how the objection came to be made. It was not so much to keep that line of evidence out, as it was to get at the leases themselves. We had tried several times to get the leases, and we finally succeeded in getting them. Our main object in objecting to this class of evidence was that it was put in in advance of our getting the leases.

Mr. COTTER. We feel this consideration, somewhat,—that both Lowell and Lawrence are somewhat remote from this point, in order to show similarity to something described in a written instrument. We believe that written instrument is in existence, and that the instrument may, during this trial, be produced. We feel that those instruments must be the best evidence, and since the specific objection is made we feel it is our duty to heed it. Let me make one other suggestion. We feel, too, that it is no hardship to you, really, because it has been suggested that this case will probably be resumed in Boston, and if there are such instruments, before the conclusion of

the case they may be produced. The suggestion has just been made that to save time this testimony might be produced and received *de bene*. If not supported by the written document later on, it is to be rejected.

Mr. MATTHEWS. If your Honors please, I think Mr. Commissioner Cotter has in mind two different objections to the witness answering this question. Apparently, the Commissioner has in mind the fact that the witness is asked something concerning the practice and prices with respect to the use of water power in Lowell and Lawrence as distinguished from Holyoke. Now, the witness hadn't got through describing why evidence of customs, practices and prices are admissible in this case, as comparable with the situation in Holyoke. We were not through qualifying the witness on that point. As to the other question, depending simply upon the law of evidence, we think it would be a great hardship not to have the same privilege extended to us as was extended to the other side. Their witnesses were allowed to state, under objection,—and I am willing to have this witness's answer go out if I do not substantiate the truth of his statement by reference to the record at the next hearing,—that water power was used in Holyoke in three or four different ways and paid for in three or four different ways. We objected; there was some argument on the question; and the questions were admitted. Now Mr. Green is asking this witness exactly the same sort of a question.

Mr. COTTER. Are you sure, Mr. Matthews, that the same objection was made then as now?

Mr. MATTHEWS. Yes, sir; I am absolutely certain about it.

The CHAIRMAN. I don't see the occasion for this. I understand Mr. Cotter says you may produce this testimony subject to producing the papers later. Would it be any hardship for you to do that?

Mr. MATTHEWS. Yes, sir; it would be impossible for us to produce all the papers at Lowell and Lawrence.

The CHAIRMAN. No one is asking you to do any such thing. If you can produce some of them we may consider that is evidence, to a certain extent, at least.

Mr. MATTHEWS. I suppose, as a matter of fact, that we could produce one or more leases or one or more contracts for the use of surplus in each of these two cities. I suppose that could be done; but it seems to me it is a great hardship to impose upon us when the same hardship was not imposed on the other side. We think there ought to be some parity of treatment of the parties in this case.

Mr. GOULDING. We say that assertion is wholly unwarranted by any facts in this case, and I want it verified before it is admitted, that we have offered any evidence to which an objection was taken of this character, that the Court admitted.

Mr. COTTER. One of the Commission didn't understand it that way.

The CHAIRMAN. Will you read that question, Mr. Turner?

Mr. TURNER. "Taking Lowell, for instance, is there a 50 per cent. surplus there recognized, in addition to the permanent power?"

Mr. GREEN. Answer that question, Mr. Main.

Mr. BROOKS. Does that go in? We certainly object to it.

Mr. GREEN. I will change the question. I will ask Mr. Main this question.

The CHAIRMAN. Has he himself had any practical acquaintance with Lowell?

Mr. GREEN. He stated when I qualified him that he had.

By Mr. GREEN.

Q. Tell what your acquaintanceship has been at Lowell.

A. At Lowell I have testified in the tax cases of the Tremont & Suffolk Mills three times, in the Massachusetts Cotton Mills once, and on each of these occasions I have had to study the cost of permanent and surplus power as sold, and I remember on the last occasion I was looking over the bills for the surplus power at the Tremont & Suffolk Mills.

Q. You can state, if you please, your understanding of the classes of power as sold there by the owners of the canal system, whatever the name of the company is.

Mr. BROOKS. I object.

Mr. GOULDING. His understanding of a written agreement?

Mr. COTTER. The classes of power sold. He said nothing about the power.

Mr. BROOKS. The class must be determined, of course, by the agreement.

Mr. COTTER. Of course. We understand a man might state he understood of sales taking place, without knowing about the terms, or the consideration or description.

The CHAIRMAN. I should like to know, as a matter of curiosity, whether there is any difference in the selling value of water power in Lowell and Lawrence, as to the amount, and Holyoke, when you come right down to the fine thing.

Mr. GREEN. There is. That is what I mean. I am taking their figures, what they ask for it.

The CHAIRMAN. They have mill power there, don't they, at Lowell and Lawrence?

Mr. GREEN. They do.

The CHAIRMAN. And it is sold like this?

Mr. GREEN. It is sold there 50 per cent. surplus and other surplus.

- Mr. MATTHEWS. If I may be permitted to interrupt for a moment, for the purpose of calling the attention of the Commissioners to one instance, which I find in looking at random through the evidence. This very same sort of a question was asked by Mr. Brooks, and answered, against our objection. I refer to Vol. V., page 150, where Mr. Allen was asked to describe the various classes of water power in Holyoke, and we objected. It was argued out, and Mr. Green says: "This all must be a matter of record somewhere; and it is a part of the records that we would like to see, so that we can see for ourselves." The Chairman says, "We admit it."

The CHAIRMAN. That is all he said.

Mr. MATTHEWS. That is only one instance out of many. That is the conclusion. I was called on a moment ago, and practically told that I was lying. Now, I was right, and I prove that I was right. I can show many instances, practically in the case of every water-power expert they put on the

witness-stand. And it seems a great hardship to us in the trial of this case, if the same rules of evidence don't work both ways.

The CHAIRMAN. Mr. Matthews, you have already said that about twenty-five times. Do you think your statement is justified, that we are undertaking to lay down a rule for one side and not lay it down for the other? In long, complicated cases like this, you know, as a lawyer, Mr. Matthews, as well as I do, that that thing was admitted, if at all, upon the principle that we be consistent, and that the leases of the Holyoke people should be produced. I try this case as a magistrate upon that theory.

Mr. MATTHEWS. I don't understand it so, and Mr. Green doesn't, either.

Mr. GOULDING. I want to call the attention of the Commissioners to this extract which Mr. Matthews read. He reads Mr. Green's objection. Mr. Green says:—

"It seems to me that the Company has the records here which show themselves the distinction between the various classes, and I do not understand that this witness can tell us anything more than what he has been instructed by the officers of the Company or what somebody has told him. This all must be a matter of record somewhere; and it is a part of the records that we would like to see, so that we can see for ourselves.

"The CHAIRMAN. You want his understanding of it?

"Mr. BROOKS. Certainly, and he was inquired of about this in cross-examination, your Honor. Mr. Matthews went into it in considerable detail.

"Mr. GREEN. I think perhaps I see what is meant now. I thought this was evidence of what would be conveyed to us, perhaps, under some circumstances, or that it was being offered for that.

"The CHAIRMAN. No.

"Mr. GREEN. If it is offered to see what he himself understood would be offered to us hereafter, that would be another story.

"Mr. BROOKS. We offer it for all competent purposes.

"The CHAIRMAN. We admit it."

Now, if I have made any misstatement of that I will eat my
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leek, and if Brother Matthews has failed to recollect it exactly as it was I hope he will eat his leek.

Mr. MATTHEWS. On the contrary —

Mr. BROOKS. This is re-direct.

Mr. MATTHEWS. On the contrary, the evidence was admitted for all purposes. That was the ruling of the Commission, and this is only one, as I say, of many instances.

Mr. COTTER. For competent purposes. It was offered for competent purposes, and the Chairman said he admitted it.

Mr. MATTHEWS. For all competent purposes, yes. There was no promise on the other side to produce the records at that time, and there was no suggestion by the Commission that the evidence should go in *de bene*.

Mr. COTTER. The witness had expressed an opinion; then in re-direct he was asked his understanding at the time he expressed that opinion, so that we might deal with the weight to be given to that opinion. It was important to reach his understanding.

Mr. MATTHEWS. His opinions were expressed in direct examination.

Mr. COTTER. Yes; if he gave his opinion under any misapprehension, of course the weight of the opinion would be reduced to that extent.

Mr. BROOKS. He was asked by Mr. Matthews in his cross examination his understanding of the various classes.

Mr. MATTHEWS. Yes, but that was strictly in cross.

Mr. BROOKS. Not at all. You will find it in the direct, where I asked it.

Mr. GREEN. On this point I do not wish to say anything except to ask permission of the Court to let Mr. Main's testimony on these points rest and become a part of the record later, because I imagine if we have to produce some records there would have to be explanation of terms, and we would have to have Mr. Main present. We might as well shorten it now by leaving it all out and if we can get these records we may have the privilege of recalling Mr. Main on that point. If we can have that privilege we will let it rest now.

Mr. COTTER. There is no objection.

The CHAIRMAN. There must be some easier method of arriving at the end of this road than this one. I know that in the Worcester case the value of horse power was testified all over Massachusetts, and similarities of condition were spoken of. There must be some brief road. - If I could remember it I would suggest it, but I cannot. I think you will find there will be no great difficulty in simplifying the proposition, provided you can show similarity. I believe the rule laid down is that there must be a substantial similarity in the two different neighborhoods. That is the rule in the Lowell case, in the 146th Mass.

Q. Can you tell us, Mr. Main, speaking from a mechanical and hydraulic standpoint, whether the powers are similar, leaving out of consideration the question of price?

Mr. BROOKS. We object to it.

Mr. GOULDING. Do you mean whether the water wheels are the same kind of water wheels?

Mr. COTTER. He can describe the powers, and then it is for us to determine as to their similarity.

Mr. GREEN. I think I apprehend Commissioner Cotter's suggestion.

Q. Mr. Main, will you briefly describe the powers at Lowell, I think we are discussing now, and Holyoke, showing them mechanically and hydraulically, pointing out the facts connected with them, so that we can see whether they are similar or dissimilar.

Mr. BROOKS. We object to that.

Mr. COTTER. The last part of it is for us to determine—whether they are sufficiently similar.

Mr. GREEN. Yes, I understand. I asked him to state so that we can determine.

Mr. BROOKS. Of course, I do not want to discuss anything that has been decided, but does not the question of what these powers are depend upon the leases of the powers and the agreements between the mills and the purchasers?

The CHAIRMAN. Personally it looks to me, gentlemen, that this is a matter which will either take a very long time to develop or will not. If you should go into this question for the

purpose of showing a similarity, it might take a week, on strict technical lines. How, otherwise, are you going to do it? I will suggest that for the purpose, if possible, of shortening this case with reference to that; if they can show there is a substantial similarity, then the evidence is competent, as I understand it. That is a question of fact for us to pass upon after they have produced their evidence.

Mr. BROOKS. I want to say now, may it please your Honors, that he has already testified to a substantial dissimilarity between the surplus at Lowell and the non-permanent at Holyoke, because he says that his understanding of the situation at Lowell is that the surplus may be shut off on notice. That is not the non-permanent water power at Holyoke, or the water power that is offered by our lease.

The CHAIRMAN. You see, gentlemen, you have got to go into this question. Now, let us go back for a minute to the ordinary common sense of things. The valuation of this water power will naturally be determined largely by the local conditions that obtain in Holyoke and the relation of things there. You may offer as much evidence of this kind on both sides as you please. It weakens as you depart from the locus, and it cannot be helped.

Mr. GREEN. I had not anticipated that my questions were going to produce the long argument that we have had or the trouble we have had over it. I did not expect our friends were going to be so technical. I had assumed that a gentleman with Mr. Main's wide experience, who undoubtedly knew about this, would be allowed to state it. I did not suppose we should have to inspect a lot of leases, and take a great deal of time.

The CHAIRMAN. Perhaps you will not have to. It seems to Mr. Cotter, and I am agreed with him, that where a question of this kind comes up, where there are four or five different leases, the character of those leases when you come to a strict question must depend on the documents. I was having in mind whether a witness like a mill man, for instance, familiar with the different things up there in Lowell, could not come forward and state.

Mr. GREEN. I am unable to say, and do not know enough

about it to suggest whether or not, if this witness points out the facts connected with these two systems, hydraulically and mechanically, whether the Commission can tell whether they are similar or not. I don't know whether I could tell whether they were similar or not. It appeared to me that it was a question for an expert of Mr. Main's ability to answer by saying whether, as a matter of fact, they were similar or not. I do not know.

Mr. GOULDING. I do not understand what my friend means by mechanically similar, if he does not mean simply what kind of wheels they use, what kind of penstocks, and what kind of gates, and that sort of thing. But what we have been talking about, what the trouble was, he was undertaking to define the rights which are of an incorporeal nature under which these parties using the power there used it. That is the difficulty I had; not a mechanical question.

Mr. COTTER. We are agreed, gentlemen, that it is for the witness to describe the situation there and to describe the power; it is then for the Commission to determine whether there is sufficient similarity here to be of assistance to them and to receive the evidence. We are agreed to that.

Mr. MATTHEWS. Might I ask why—

Mr. COTTER. Excuse me just a moment. (Conferring with the other Commissioners.) And I might state further, gentlemen, we are also agreed that this witness may go on if he is familiar with the situation of things and the kind of power that is in use in Lowell and Lawrence, that he can describe these powers or he can describe these rights, that he can describe the situation of things there; but the prices and the conditions that are expressed in the leases, those, of course, we would hold open subject to the rulings which we have already made. But he can describe what he found there upon an examination.

Mr. MATTHEWS. If your Honors please, I would like to answer Brother Goulding's question. He says he does not understand the reason why we want to know whether this power in Lawrence and Lowell is mechanically similar to the power under discussion in Holyoke. The reason is this: there

are only two classes of water power, as we understand it, from a mechanical standpoint or in a hydraulic sense. There is water power as such, which is dependent on the permanent flow of a river, and is supposed to be available at all times, at all seasons, in all years, even the dryest — to be available to the mill owner all the time, except when the water is out of the canals for some accidental reason. All the rest of the power that you can get from a dam is surplus ; that is, it is intermittent power ; it is power which you cannot depend on, which does not exist in dry years, and it is hydraulically or mechanically a different thing entirely. We desire to show by this witness that everywhere except in Holyoke there are simply these two classes of power recognized in the practice of the mills ; that is to say, that everywhere except in Holyoke there are legally, so to speak, and practically also, only two classes of power, corresponding to the two mechanical classes of water power. In Holyoke, however, the Company has for some 15 or 20 years been in the practice of making a new class of power, as it terms it, by means of perpetual leases. It is surplus power mechanically and hydraulically speaking ; but it is power to which the lessee has a right, whenever it exists in the river, and cannot be shut off at any time, as is the practice in the case of the Company at Holyoke in respect to what they call surplus, and as is the practice, as we understand it, in Lawrence and Lowell with respect to all kinds of surplus. In other words, the so-called non-permanent water power in Holyoke is not a distinct class of power from a hydraulic or mechanical standpoint, but is simply a description of a form of indenture or lease or contract which the Holyoke Water Power Company enters into when it can with its several tenants and lessees.

The power which is to be valued in this case is not existent as a water right. There is no easement, right or privilege appurtenant to this electric light station which this Commission is called upon to value. What this Commission is called upon to do is to fix a price and the terms for a new water right which is to be created for the occasion. The Commission is to order the City of Holyoke to purchase certain physical plants,—an

electric light plant, gas plant and water plant,— and in addition to that, the Commission is asked by the Company to compel the City to enter into a contract for the future use of power. They call the power, or they did call the power, which they propose to offer to us, and which they wish the Commission to fasten upon the City, “non-permanent”; not because there is any hydraulic or mechanical difference between the power we should get under such a lease and what is ordinarily called surplus, but because they propose to give us on the one hand a perpetual right to it, and to compel us on the other hand to pay rent in perpetuity for it.

That was the original position of the Company, as we understand it, which was somewhat modified, however, by the offer made by Mr. Gross at a later date in the case, by which the Company offers us, or rather, asks the Commission to order us to hire, a power which is neither non-permanent nor surplus nor permanent, but a mixture of all three. It is practically permanent power in the hydraulic or mechanical sense for Sundays and holidays, being subject to interruption only for accidental reasons, and it is surplus power for the rest of the time. In other words, what the Commission is now asked to do is to fix the terms and conditions upon which we shall have the right to draw water from the first level canal to run this electric light plant, and to fix the price we shall pay for such power. It is to value, in other words, a right or contract to be created for the occasion, and which is non-existent now. That is the real thing that this Commission has before it, so far as the water power part of this case goes, and not the estimation of the value of an existing water right or class of water power. The Commission may vary the terms of this proposed lease. They may adopt the Company’s idea, and bind the City in perpetuity to pay a fixed rent according to the maximum amount of power which the wheels will use. They may adopt the City’s theory, which has been sufficiently outlined by the evidence of this witness, that the most that the Commission should do is to give the City the right to draw water and pay for it as measured. Or the Commission might, for all we know, adopt some intermediate suggestion, and impose upon the City terms and conditions which

are not suggested by either side. But the issue in the case — the water power part of this case — relates to the terms and conditions of a future and to-day non-existing contract, and as to the price that shall be paid for a water right that is to be created for the occasion. At least, that is our theory of this case, and a very important part of it.

We want to show by this witness what, from the mechanical and hydraulic standpoint, this power is that the Holyoke Water Power Company wants us to take. And, having found out what it is, we propose to show that similar power is sold under similar conditions in other parts of the State for a certain price; and, as preliminary to getting at the price, Mr. Green is asking the witness to describe the practices under which water power, permanent and surplus, is sold in the places which he has named (Lawrence and Lowell), just as was done by witnesses on the other side in the case of Holyoke itself. Having got the practices and conditions, the Commission will then be in a position to see whether the power which we ask them to give us — for we are entitled to try our case, I suppose, upon our own theory, just as the petitioners have tried theirs — the Commission will then be in a position to see whether the kind of power which is all we say the Commission has a right to force upon us is similar to that which the witness is asked to value in the case of Lowell and Lawrence. It is a part of that line of evidence to show, if we can, that the power that they propose to give us, or rather the power that we think the Commission ought to give us, is similar, from an engineering, hydraulic, and mechanical standpoint, to the power of which he is to give us the price at Lowell and Lawrence.

Mr. GOULDING. May it please your Honors, again we have an exploitation of the general theories of this defence, without much relevancy to the question that is before the Court. I am not going to review the speech that has now been made, displaying the defence which is set up here, and the theories that they proceed upon, except to say that the true view is diametrically opposite to it. This Commission has got to value our plant, and the water power will be found, I think, to be a part of it; but I will leave that branch of the discussion to a later time.

What I want to now say is that, as I understand it, the language used by the learned counsel on the other side as descriptive of things, is used in a sense that nobody ever used it before and I believe nobody will ever use it again. That is to say, he is trying to draw a distinction between hydraulic and mechanical situations on the one side and legal situations on the other. That is to say, he says that by reason of certain agreements that parties enter into with reference to the river, whether the Merrimac or the Connecticut River, there is a distinction in power, mechanically and hydraulically, that does not exist if it wasn't for those agreements. Now I submit to your Honors that permanent power, non-permanent power, surplus power, under any description whatever, differ in no particular between themselves, mechanically or hydraulically. There is no hydraulic difference between a permanent power and a non-permanent power. There is no mechanical difference between a non-permanent power and a surplus power. There is no hydraulic difference,—none whatever. The mechanical operation of applying a power that comes from surplus, or surplus surplus, is precisely the same as the mechanical operation of applying the permanent power. The water falls upon the wheel and turns it. That is all there is to it. There is no hydraulic difference whatever. The water flows through the pipes—and that is what hydraulic means, I believe—flows through the pipes or channels onto the wheel, and produces the effect precisely in the same way. So that this talk about hydraulic difference and mechanical difference as applied to the agreements of men has nothing to do with the case. What has something to do with the case in this particular is the legal difference, the legal difference between these two and three classes of power—and it arises out of the stipulations as to the order and the conditions under which each one may use the mechanical and hydraulic appliances and forces that are there; and in either case they are used in the same way, but their rights are determined by the agreements of the parties, and that is what they are trying to go into here, showing what the rights arising out of agreements are with reference to these powers; and the power in each case is a hydraulic power, the

power in each case is a mechanical power; and the other differences further than mechanical and hydraulic differences do not arise between these several powers; but the only distinction is between the legal rights of the parties under the different leases, and those legal rights, we say, must be determined by the instruments, and I do not understand there has been any ruling to the contrary.

It is not necessary for me to stop to deny the proposition that you are to create a new contract here. You are, in a sense. Suppose this plant had a right of way appurtenant to it, or the land had a way, I would say, used in connection with it, the whole ground being owned by the petitioner in the case. Of course, when you assigned a right of way over the land that you did not take absolutely, you are creating a new relation, because there cannot be an easement over land owned by the same owner, appurtenant to it, over land owned by him. In that sense, and only in that sense, you are to create a new right. You are to take this plant as you find it. You are to determine the price that is to be paid for it.

The CHAIRMAN. I would like to talk with the Commissioners on this. There is one thing that has come into my mind during this discussion that troubles me, because I have been struggling to do my best to see if there wasn't some way by which these leases would not have to be produced, or the documents from the other cities. But the difficulty arises in my mind just from that very fact, from the suggestions made by Mr. Matthews, as well as by Mr. Goulding. How does this witness know, how can he know, excepting in a general way, that the same conditions obtain for the use of water, surplus water or permanent water, in Lowell, that obtained in Holyoke? If he does, as a fact, know that, then that would simplify the matter. But that is dependent, surely, upon the terms and conditions of the leases, etc., that have been made there. If, however, that has gone into general use, is universally understood at Lowell and Lawrence, so that mill men understand exactly what is meant by this term and that term, and the similarity of that thing can be pointed out, showing substantial similarity here, of course we will go forward with the evidence.

The suggestion I would make to my associates is this: that we might hear this evidence and then examine it, look it over, and if it becomes necessary upon the strength of the statement made here by the witness to go beyond, we can do so. Take it *de bene*, and then exclude it; or, if we do not, obtain the further evidence, provided we require it. We think you can go ahead, Mr. Green. We will take this evidence *de bene*, and then, if, upon further examination, we think it is sufficient, we will let you know. Certainly we cannot do anything else.

Mr. BROOKS. Please note our exception to all this testimony.

Mr. MATTHEWS. If your Honors please, the difficulty with our case, as it is left by the suggestion just made by the Chairman, seems to be that the logic of that situation will necessitate the production of all the leases for permanent and for surplus power that there are, and all the contracts for the use of surplus power, in Lowell and Lawrence.

The CHAIRMAN. You misunderstand me, Mr. Matthews. We say we will take this evidence *de bene*, just as you offer it. Then if that is competent testimony we will use it without requiring you to do more. Now what else can we do?

Mr. MATTHEWS. Well, we think we are entitled to a ruling.

The CHAIRMAN. We cannot rule on that subject, because we are not prepared to do so, and we may not be prepared. You have offered this evidence; we take it.

Mr. MATTHEWS. We have not put in the whole of our evidence on this question of similarity.

The CHAIRMAN. I understand that. Now you go ahead and give this evidence, and if we think it is sufficient then you won't be troubled beyond that.

Mr. MATTHEWS. There may be similarity in conditions with respect to two matters: first, with respect to the character of the power; and, secondly, with respect to the manner in which it is used. Now we have certainly shown by this witness already a similarity in respect to the character of the power. Water power is water power, just the same in the Merrimac River as in the Connecticut, and surplus power is

surplus power. It is what you can get after the permanent yield has been leased, and is certainly the same in one place as another. Lowell and Lawrence are not too remote in distance to be comparable with Holyoke. But we had rather supposed that we ought to show a similarity of usage, as that is one of the questions that has been discussed on both sides at great length in this case.

The CHAIRMAN. That is what we wish you to do.

Mr. MATTHEWS. A good deal may turn on it. Now, there is a general custom in Lowell and Lawrence with respect to the manner in which surplus power is used and sold, and this witness knows it. Cannot he state it?

The CHAIRMAN. We say we shall admit his evidence *de bene* on this subject as you offer it — on this proposition — against the objection of the other side.

Mr. GOULDING. What I want to have distinctly understood is that, if they are going to put any prices in here that arise out of written agreements, we want every written agreement that they take the price from.

The CHAIRMAN. We have not reached that point yet.

Mr. MATTHEWS. There are two questions that we want to put to this witness, one of which Mr. Green has already put in substance. First, whether there is a general usage and custom with respect to surplus power, and what it is; and, secondly, whether there is a regular market price for surplus power, and, if so, what it is.

The CHAIRMAN. Well, we admit both those questions *de bene*.

Mr. GOULDING. We submit to your Honors that that is entirely a new question, and it cannot be competent in any view. It cannot be that there can be a general custom which shall controvert written agreements.

The CHAIRMAN. We have admitted the evidence *de bene*.

Mr. GOULDING. It is not *de bene*; it is *de male*.

The CHAIRMAN. Well, we prefer to put it our own way, Mr. Goulding. Go on.

By Mr. GREEN.

Q. You were describing the power in the two places. It is

so long ago I have really forgotten. If you will please continue. A. I was describing the surplus, the similarity of power in the three places.

Q. Yes. A. In each of the places, Holyoke, Lowell, and Lawrence, there are printed regulations for the use of surplus which are similar.

Mr. BROOKS. Is this competent, may it please your Honors?

Q. To leave out the questions of the printed regulations, whether the actual use of surplus in places is similar? A. The use of surplus is similar.

Q. What is there about the use? Tell what the use is at one place and what the use is at the other, using Lowell alone and Holyoke as a comparison. A. Speaking from a physical or hydraulic standpoint, the underlying principles which govern the use of water are the same, whether it is permanent or surplus or any other kind.

The CHAIRMAN. You agree with Mr. Goulding on that?

A. (Continued.) In the mechanical arrangements by which it is used there is quite a difference in the different places, and probably no two mills have exactly the same arrangement of machinery and penstocks, wheels and tailraces; but in the general application of the water to these various mechanisms, in each place the use is similar and the same.

Q. In the way it is used in Lowell are there devices or means attached to the wheels for determining the amount used?

A. There are.

Q. And, briefly, what do these devices do? What do they tell? A. They tell the amount of gate opening and the head which is acting upon the wheel.

Q. Do you know how in Lowell the amount of water is ascertained for the purpose of determining the amount of surplus being used? A. It is determined by the Proprietors of the Locks and Canals, by sending round what is known as gate readers, who take the readings of the gate openings at stated periods, and from these records the amount of surplus which is used is determined.

Q. Do you know whether there is any accepted or uniform practice in Lowell as to how the surplus water is sold?

Mr. GOULDING. I object.

A. I do.

Mr. BROOKS. It all comes in under our general exception.

Q. In what way is it sold? A. It is divided into three general classes, one of which is surplus up to 40 per cent., and another is for surplus over 40 per cent., and a third one is for the use of night water. There are some charges which are not included in these three, which are intended as fines if anyone takes water to which they are not entitled.

Q. You spoke of 40 per cent. surplus. That is 40 per cent. on the permanent? A. That is 40 per cent. of the permanent power which is owned by any one mill.

Q. There is the permanent and the 40 per cent. surplus and the surplus beyond the 40 per cent. A. That is all classed as one kind of power.

Q. And I understand that the surplus is sold measured?
A. Yes.

Q. Tell us if there is a regular market price in Lowell for the surplus which is sold in excess of the 40 per cent.?

Mr. GOULDING. I object.

The CHAIRMAN. You can examine him on his qualifications if you want to.

A. There is.

The CHAIRMAN. Do you want to examine him?

By Mr. GOULDING.

Q. I suppose that this is all fixed, is it not, Mr. Main, by leases or rules that are printed or written, between the parties?

A. Agreements, yes.

Q. Agreements in writing? A. Yes.

Q. And that is what you mean by market price, that they all happen, you think, to be the same? A. Well, if I might explain it — I can explain that.

Q. Well, what I want to know is whether it is all a matter

of regulations by written agreements between the parties? A. It is.

Q. Either embodied in the agreement or referring to rules that are printed? A. It refers to rules. All parties are treated under these same rules.

Q. And they are referred to in each agreement, I suppose? A. I suppose they are.

By Mr. BROOKS.

Q. And in the case of Lowell the owners are users of the power, aren't they? A. The corporations that use the water are owners in the Water Power Company.

By the CHAIRMAN.

Q. That is, they belong to the Water Power Company? A. They do.

Mr. GREEN. Stockholders, I suppose, just as Mr. Robb's company has stockholders in the other companies.

By Mr. BROOKS.

Q. I want to ask you, if I am permitted, along this line, whether or not this so-called association that owns the water power and distributes it has ever paid a dividend or ever made any division?

Mr. GREEN. Well—

The CHAIRMAN. Answer the question.

A. I cannot answer that.

Q. Or do you know whether or not the mills that enter the association, that are members of the association that own the water power, have ever paid rental for it? A. I do not know that.

The CHAIRMAN. Ever paid what?

Mr. BROOKS. Ever paid rental.

By Mr. GREEN.

Q. Now, what is the market price for—

Mr. BROOKS. May I ask one thing more? I have a right to on qualification.

Mr. GREEN. I do not think this is a question of quali-

cation, asking the witness whether the company has paid a dividend.

Mr. BROOKS. You are asking him about market value.

Mr. GREEN. Yes, but —

By Mr. BROOKS.

Q. Has the permanent power been remitted, or the rentals for it, for something like ten or fifteen years at Lowell? A. I understand that they have.

By Mr. GREEN.

Q. Will you tell us now, if you please, what the market price is in Lowell for the surplus power which is sold above 40 per cent.?

Mr. BROOKS. We want an objection entered.

The CHAIRMAN. That raises a question of fact.

Mr. GREEN. Strike that out, if you please; what the market value of the surplus water power is in Lowell in excess of the 40 per cent. surplus?

Mr. BROOKS. We object to it.

Mr. GOULDING. That is on an entirely different footing. What we had supposed they were trying to get in here was actual payments. Now he wants to know what the actual value of the power is there.

Mr. GREEN. I suppose I have a right to ask it.

Mr. GOULDING. Not the market value of other property. You cannot ask the market value of other properties. You can put in sales or actual rentals.

The CHAIRMAN. The case in the 146th Mass. goes on this principle: it seems to vary a little from the ordinary rule, and that part of the opinion I will read. (Reading from page 413.)

“All the questions raised in the third case, except that as to the admissibility of the testimony of Henry F. Coe, are considered, and decided in the first case. He was permitted to testify ‘what mill water power was worth in Lawrence.’ If the conditions which affect the value of water power are substantially the same in Lawrence as in Lowell, his testimony would aid the County Commissioners in determining

its value in Lowell. It does not appear that the conditions are not the same, and therefore the petitioner fails to show that the evidence was incompetent."

This was a hearing to determine what the power was worth, and the corporation assessed

"called as a witness Henry F. Coe, formerly agent of the Washington Mills of Lawrence, who, after testifying that he had had to do with the purchase of mills with water power in Lawrence and in Vermont, was permitted to testify, against the objection of the petitioner that it was incompetent, what mill water power was worth in Lawrence."

Mr. GOULDING. Now that is the report of that case. I do not understand that in that case it means that he was allowed to give his opinion of the worth of water power in Lawrence, but simply what it was worth, meaning what it sold for — what they got for it there — the sales of it.

The CHAIRMAN. Certainly.

Mr. GOULDING. I do not think he was allowed to give his opinion.

The CHAIRMAN. I want to thoroughly understand it. (Consulting with Mr. Cotter.) Before that question is put it seems to be our duty now to determine upon the evidence whether there is a substantial similarity between the water power of Lowell and of Holyoke. That is a question of fact for us to determine, and we have to determine it on this evidence. Now, gentlemen, we will hear you on that if you desire to be heard. I have not followed the evidence strictly here. Have you put in all the evidence on this subject you desire to?

Mr. GREEN. Yes, sir.

Mr. MATTHEWS. Has the witness been asked what this power sells for in Lawrence or Lowell?

The WITNESS. I have not.

The CHAIRMAN. The question put to the witness now is, What is the market value? If we find there is a substantial similarity in the character of the water power at Holyoke

and Lowell, then we shall admit this question. Now the question is whether there is a substantial similarity on your evidence.

Mr. MATTHEWS. If your Honor please, why should not the other question be admitted also, What was the price?

The CHAIRMAN. Because, Mr. Matthews, the Court always holds that you must show a substantial similarity before you can ask the other question; that is the reason.

Mr. MATTHEWS. I admit that; but if we show a substantial similarity why are not both the questions admissible—at least, the first question that Mr. Green put, “What is the market price or selling price of this water power in Lawrence and Lowell?” Of course that question calls—

The CHAIRMAN. Mr. Matthews, we have asked you to discuss the proposition whether upon your evidence there is a substantial similarity between Lowell and Holyoke. That is the question we want discussed.

Mr. MATTHEWS. Yes, sir, but perhaps we are talking at cross-purposes. I understood your Honor to say a moment ago that if you found a substantial similarity of conditions you would let in what is the market value of water power in Lawrence and Lowell. Now I ask, if you find those same conditions, why you should not let in the question, What is the market price?

The CHAIRMAN. Why should we not determine that question when it is reached?

Mr. MATTHEWS. I thought it had been asked.

The CHAIRMAN. It has been asked, but before we reach it we have got to determine whether there is a substantial similarity between the two.

Mr. MATTHEWS. I understood your Honor to shut out the question of market price, which to my mind stands upon stronger ground than the other.

The CHAIRMAN. No, we have not shut it out. Before the question is discussed we should like to hear the substance of the witness's testimony as to the conditions with reference to water power at Lowell. Mr. Green, will you state it?

Mr. GREEN. I think, if your Honor please, I can state it with substantial accuracy. I will try to. It is in evidence, of course, what the water power is in Holyoke. Briefly, the power they offer us, with one or two slight modifications, is power which is subsequent to the 50 per cent. surplus.

The CHAIRMAN. We understand that. We want to know what the witness has stated.

Mr. GREEN. This witness says that in Lowell, the place we are dealing with, they have permanent power; they have a surplus which is 40 per cent. surplus instead of 50; that is, the right to draw water to be paid for as surplus water to the extent of 40 per cent. of their permanent water; and then, subsequent to those two, is a surplus water which is sold measured — they have apparatus for measuring it upon the wheel — which we say as water power, and hydraulically, is substantially the same with the non-permanent in Holyoke. The mechanical devices make no difference in the power itself. Now we say that this water, which they offer us as a non-permanent water, — it is a matter of subsequent argument to some extent, I admit, — but it is our claim that that non-permanent water is nothing in the world but surplus water under a contract. But it is our claim that that is surplus water put into a contract, and it comes in the same place and corresponds to the same water which is sold in Lowell under the surplus rates which follow the 40 per cent. surplus. Now that being so, it seems to us that the similarity is sufficient to warrant this value.

Mr. BROOKS. May it please your Honor, I want to be heard on this for a moment. We say the question is whether or not the surplus in Lowell is similar in its character to the non-permanent power that we offer to the City. In the first place there is nothing shown here to your Honors about the amount of water power in Lowell as compared with the water power in Holyoke, and we think that is very essential. We claim, and I think it is the general understanding, that the water power of both Lawrence and Lowell is not equal in quantity to the water power in Holyoke. Again, we say at

once Mr. Main raises a very strong dissimilarity between the surplus power in Lowell and the non-permanent power in Holyoke, because the non-permanent power is a power that remains forever, so far as leases can make it; it is a power that cannot be cut off by notice, and the surplus power in Lowell, he says, is a power that may be cut off by notice by the Proprietors of the Locks and Canals to the person taking it. Again, we say that the very men in Lowell who use this water are the owners of it; and the permanent power, as Mr. Main says, has for many years had its rent remitted, for the reason that all the owners are equal owners in the power. And as my friend suggests, it comes down to this: there is no division of the rent, there is no market value of the power in Lowell, but it simply comes down to a division of the property that the corporations who conduct the manufacturing business in Lowell own. We say at once that they themselves have shown the utter dissimilarity between these two powers.

Mr. GREEN. If your Honors please, it appears — one other thing that I did not suggest — that the permanent power is leased in both places, and I would like to call my brother's attention to the fact that there is nothing in this evidence that shows the amount of water power that they have to lease in Holyoke; that the Company has offered nothing in this case, but has most carefully concealed it, and that it remains to this day a matter of entire guess on the evidence as to whether or not there is anything that is covered by this non-permanent lease, so-called, if the Company are a mind to say to us, "You can have what you pay for and nothing more." It seems to me that all that is stated which is evidence in the case, and not suggested by counsel, goes to the weight and not to the admissibility. It seems to me we have shown sufficient similarity. I do not know whether Mr. Brooks's statements in regard to the ownership there are true or not; they may or may not be. I presume he believes them or he would not make them.

Mr. BROOKS. It is not a question of my belief. I know nothing about it.

Mr. GREEN. Just a moment.

Mr. BROOKS. Oh!

Mr. GREEN. On the theory of the law as we understand it in this case, all we can have under this lease is purely surplus. We are only to have it when in the opinion of their hydraulic engineer they have a sufficient quantity in excess of four other quantities.

Mr. BROOKS. It is not my statement with reference to this ownership of water power in Lowell; it is Mr. Main's, their witness. I know nothing about it. I make no guess at it.

The CHAIRMAN. What do you understand the facts to be as stated by Mr. Main on that, Mr. Brooks?

Mr. BROOKS. Why, my understanding of the facts is this, that the proprietors of the various mills own this water power.

Mr. MATTHEWS. At Lowell, Mr. Brooks?

Mr. BROOKS. At Lowell, yes; that is what I understand him to state.

Mr. MATTHEWS. Or Lawrence?

Mr. BROOKS. No, we are talking about Lowell; that they have remitted any rental for permanent power; that so far as he knows, no dividends are declared; and it comes right down to this, that it is really a division among themselves of their own property.

The CHAIRMAN. You claim, then, that there is no such thing as market value of water power in Lowell?

Mr. BROOKS. That is what I say.

The CHAIRMAN. That relates to the question just asked him.

Mr. BROOKS. He is asked — that is the very question that comes up now — he is asked what the market value —

The CHAIRMAN. The question we are trying to decide now, Mr. Brooks, is whether there is a substantial similarity.

Mr. BROOKS. I understand that; but I say this discussion arises under this very question that your Honor suggests — what the fair market value is. But I say that the dissimilarity in the situations is still present. The Water Power

Company at Holyoke sell their water. They sell it in the open market. Lowell's is not sold in the open market; it is taken and used by its owners. That is where I say the dissimilarity is.

The CHAIRMAN. Now, gentlemen, in this matter we naturally rely to a large extent upon the engineer of the Board, and he says that he cannot appreciate that similarity between the two conditions that will assist him in determining the value of water power at Holyoke. That is his view of it; we are disposed to follow it. That does not conclude you from raising the question, perhaps, upon more direct evidence; I do not know as to that.

Mr. MATTHEWS. Will your Honor indicate how we could possibly show similarity of conditions on any other stream or in any other town than Holyoke? The Lowell case may stand by itself owing to the fact that Mr. Brooks has brought out. But take Lawrence, for instance, if we have not shown a similarity of condition between Lawrence and Holyoke, how could it ever be shown?

Mr. BROOKS. I haven't heard anything —

The CHAIRMAN. Lowell, you have reference to, I suppose?

Mr. MATTHEWS. There may possibly be some doubt about Lowell, owing to the peculiar ownership of the water property there; but still, even in that case, if there is a regular market price or value for this class of power there, and this witness knows it, it seems to me it is admissible. As to Lawrence, that particular objection does not hold. Now what I want to suggest is that if there is no similarity here, apart from this one question about the ownership of the water rights at Lowell, it could never be shown. Here is water in the same State. It is not far apart. It is divided into permanent and surplus. The permanent is exhausted in both cases, and we are considering the question of surplus. It may be that there is no similarity between the surplus power that Mr. Main describes and the class of power that they offer us, or the rights or easement that they offer us; but we claim as

matter of law that they have no business to offer such a lease as that, and that the Commission has no legal authority to compel us to take it. As far as the power goes they must substantially be the same, or else we could never show similarity in any case. There is surplus water here in Holyoke, and that is all there is; and that is comparable with the surplus water in Lawrence and in Lowell. Now your Honors are asked to carve out of that surplus water some sort of a contract. That, it seems to me, is a subsidiary and different question, the decision of which will turn largely upon your Honors' construction of the law. They claim they have a right to force the City through the order of the Commission to take a perpetual lease and to come under an obligation to pay rent for the future. We say they have not. We say the most the Commission can do is to compel us to pay for measured water as we use it.

The CHAIRMAN. Of course we have not passed on those questions.

Mr. MATTHEWS. I understand, sir; but the point I desired to make now was simply this: that, while there may be no exact similarity if the question turns upon the exact lease that they offer us, there is a similarity if you take into account the kind of a lease we say the Commission ought to order us to take. That suggestion throws out entirely, as your Honors will perceive, the peculiarities of this indentured non-permanent power, and brings the issue right down to the valuation of surplus water power in Holyoke, as that phrase is commonly understood.

The CHAIRMAN. Of course we have not undertaken for a minute to pass upon —

Mr. MATTHEWS. Oh, I understand.

Mr. GOULDING. Pardon me a single word. There is a certain sense in which there is a similarity, inasmuch as you can use the same word to describe surplus. But if my friend's law that he has advanced at some stages of this case, to wit, that every subsequent grantee must be subject to the prior grantee,— a proposition which has seemed to me to have great

plausibility, and I should find difficulty, perhaps, in answering it,—if that is so, then every second purchaser is purchasing a surplus power. Take the purchaser of permanent power. Every second one is purchasing a surplus over the rights of the first one; and it is only in that general and vague sense that the two classes of surplus water may be said to be similar, but there is a similarity close enough to make it admissible in evidence.

Mr. GREEN. If it has not appeared,—I think it has, as a matter of fact,—what Brother Goulding says would not be so, because no non-permanent water was ever sold from the canals of the Water Power Company, and I don't think any official here would say otherwise, until after the permanent water had been exhausted in the upper level canal.

Mr. GOULDING. My friend does not understand me. I say the second purchaser of water power is purchasing surplus in a sense, and just as cogent a sense as that in which it is sought to make this evidence competent.

The CHAIRMAN. Perhaps, gentlemen, on this question I might say this: Take under ordinary conditions the streams. There is only one kind of water power known, excepting in a few places in Massachusetts, so far as I know; and I know a little something about the subject. I confess I do not see, when the question is brought up as sharply as it has been this morning, how you are ever going to show a similarity. There is hardly a substantial similarity on the Blackstone River, the Chicopee River, and the Merrimac River. There are so many differences entering into the valuation and condition of water power, even within brief distances, although the evidence has been received,—I think in the Worcester case always without exception, and I do not know of its ever being received under objection. When you come to worry yourself and think over that question of these dissimilarities, it will usually, to my mind at least, outweigh the similarities; but, as I say, here we do not think that is so. We hold that there is not a substantial similarity here, so we cannot take the evidence.

Mr. GREEN. In order to save time I might ask this ques-

tion: Will you tell us at what price the surplus is sold at Lowell, referring to the surplus which is sold in excess of the 40 per cent. alluded to? I understand that is ruled out, and we will save an exception.

The CHAIRMAN. Yes.

Mr. GREEN. And then the other question I think was put in: What is the market value of the surplus water sold in Lowell in excess of the 40 per cent.?

Mr. BROOKS. That we object to.

Mr. GREEN. I should like to save an exception to that. Now I should like to ask your Honors, to save time, whether upon the same state of facts in Lawrence the same reasons which led you to say that there wasn't sufficient similarity would apply in this case? I do not know how far the ownership of the locks and canals enters into this. I do not care to spend any time going into it.

The CHAIRMAN. Yes, sir. We exclude any evidence offered with reference to Lawrence, it being stated that the conditions are substantially the same.

Mr. GREEN. With the exception of the ownership. That is, we do not understand —

The CHAIRMAN. I had not finished what I had to say, but you go ahead and finish it. You understand that thing better than I do. With the exception of the ownership.

Mr. GREEN. I think I will allow the witness to state what the facts are in regard to Lawrence. I may be mistaken myself.

Q. If you will describe the power there, as it is used.

Mr. BROOKS. This comes in subject to our exception.

A. Owned and used?

Q. The water power development and the kinds of water that are sold there,—the kinds of water that are commonly sold.

Mr. COTTER. In Lawrence.

Q. In Lawrence.

Mr. BROOKS. This comes in subject to our exception.

A. At Lawrence there is a dam on the Merrimac River

which diverts the water into two canals, one on the north side and one on the south side of the river. The water is used there under one head, the heads being practically the same for both canals.

Q. What is that head? A. It is about 28 feet at the normal stage of the river. The water is divided into permanent and surplus. Nearly or quite all of the permanent has been sold. I understand there are a few mill powers of permanent which have not been sold. Beyond the permanent power there is a surplus which is sold to the mills as they use it. It is measured. Record is kept by the Essex Company. Records are taken twice a day, and worked up by the Essex Company to determine the amount of surplus water power which is used by each mill, and each mill pays for the amount which they use.

Q. Is the surplus water itself divided? A. It is divided into three or four different classes. The first class, we might say, is the surplus up to 50 per cent. There is another class over 50 per cent. There is also a charge for the night use of power from 6 P.M. to 12 midnight, and another charge from 12 midnight to 6 A.M. in the morning.

Q. Is there any established and recognized price in Lawrence for the surplus in excess of the 50 per cent. surplus?

Mr. BROOKS. We object to that.

The CHAIRMAN. You may answer.

A. There is.

Mr. BROOKS. We except to it.

Mr. GREEN. Now I desire to ask the same two questions of this witness. What is the price at which the surplus is sold in Lawrence in excess of the 50 per cent. surplus, and also the market value in Lawrence.

The CHAIRMAN. Well, Mr. Turner, do you see any difference?

Mr. TURNER. I cannot tell till I know what the Essex Company is. If the Essex Company is the same kind of combination that there is in Lowell, I should think the same objection would hold. If it is a company organized to develop

and sell water power as it is in Holyoke, I think it might be similar and admissible.

The CHAIRMAN. Selling the same kind of water?

Mr. TURNER. Selling the water in the same way.

Q. So far as you know, is there any community of ownership between the owners or proprietors and the users there?

A. So far as I know there is no connection of any sort.

Q. And is the situation, so far as you know, between the owners of the canal system and the users of water the same as in Holyoke?

Mr. BROOKS. We object to that.

The CHAIRMAN. You had better state what it is in each. What is it in Lawrence?

Mr. BROOKS. Does he know?

The CHAIRMAN. If you know, I mean.

The WITNESS. The Essex Company is a corporation which owns the water power and sells it to the mills, and the corporations which own the mills are not owners in the water power.

The CHAIRMAN. Sells it or lets it?

The WITNESS. They have sold some and leased other portions.

By Mr. BROOKS.

Q. How do you know, Mr. Main, that the corporations are not owners in the water power? A. So far as I know.

Q. Well, you don't know, do you? A. That is my understanding.

Q. Now I am asking really for your knowledge. Do you know anything about it? A. Well, I think I do.

Q. Do you know anything except what somebody has told you? A. All that I know, Mr. Brooks, is by having been connected with the Pacific Mills of Lawrence for eleven years.

Q. That was how long ago? A. I left there about ten years ago; and since leaving there I have been engineer for the Washington Mills in Lawrence, for George E. Kunhardt in Lawrence, and in connection with those two mills I have

had occasion from time to time to keep track of the use of water power in that town.

Q. Well, now, it runs back to the original question. Do you know whether or not the corporations taking water from the Essex Company's plants are interested in the ownership of the water? A. I am morally certain that they are not.

Q. But personally you know nothing about it? A. I haven't seen any contracts —

Q. Now what is the amount of water power developed? A. — that they own.

Mr. GREEN. Let him finish his answer.

A. I haven't seen any papers or contracts that show that the mills own any stock.

Q. You haven't seen the contracts?

Mr. GREEN. What contracts?

A. Showing that the mills own any stock in the Water Power Company.

Q. That is, you have not seen any contract showing that the mills own stock in the Water Power Company? A. I have not.

Q. Now whether they exist or not you don't know? A. Why, absolutely, I do not.

Q. What is the amount of water power developed at Lawrence? A. The permanent power is about 10,000 horse power.

Q. The amount of water power developed at Lawrence is very greatly less than that developed at Holyoke, isn't it? A. I understand it is about a third.

Q. And what is the permanent power at Lawrence? A. About 10,000 horse power.

Q. But what makes it permanent? A. The ability of the Essex Company to depend upon the flow of the Merrimac River to furnish this power for every day in every year for all time.

Q. That is, it depends upon the flow of the river? A. It does.

Q. And have you made any investigation to compare the

two, the permanent power of Holyoke and the permanent power of Lawrence, with reference to their permanency? A. I have made no investigation.

Q. The water power of both Lawrence and Lowell combined is not equal to the water power of Holyoke, is it? A. I think it is not.

Q. Is it a fact that in Lawrence there are periods when the permanent water is not furnished? A. In the eleven years when I was there connected with the mill, I think there were a few days in one year when some of the permanent water was not furnished.

Q. How was it last year? A. I think there was no restriction last year.

Q. Are you certain about that? A. I am not certain.

Q. How was it year before last? Was there restriction on the use of permanent power? A. I think there was not.

Q. Have you made any investigation to compare the variability of the head of the permanent power at Lawrence with Holyoke? I mean the head on the wheels? A. In Holyoke there are two levels, two falls, which are not affected very materially by the rise and fall of the river.

Q. That is, at Holyoke there is substantially no variability of head on the wheels? A. There is a large variation, of course, on those wheels that discharge into the river.

Q. But I am talking now about the first and second canals, not the third. A. There is some variation between the first and second canal when the water is below the dam.

Q. Can you say that substantially it is a steady head? A. Fairly so.

Q. How is it at Lawrence? A. There are times at Lawrence when there is considerable back water.

Q. Then can you say fairly that the head of the water on the wheels is more variable at Lawrence than at Holyoke? A. Taking all the wheels together, you can.

Q. Do you know what the amount of variation is at Lawrence? A. I do.

Q. What is the amount? What is the average? A.

Oh, I can't give you the average. I thought you wanted the maximum.

Q. Well, give us the maximum, the minimum, and average. A. The usual variation —

Q. Is that the average variation? A. No.

Q. Give us the maximum, the minimum, and the average. A. I can't give exact figures on any of those things.

Q. Very well, let it go. A. Except for definite times. I can give you something that is definite, but I can't give you the average.

Q. You cannot give me the maximum and minimum? A. Yes, I can.

Q. Well, what is the maximum that you know about? A. 27 feet.

Q. What is the minimum? A. Nothing.

Q. And the head is 28 feet? A. It is.

Q. So that there is 27 feet out of 28? A. Yes, twice in my knowledge.

Q. Well, then they lost the permanent power, didn't they? A. They couldn't run any of the wheels.

Mr. BROOKS. That is all.

Mr. GREEN. Now I will go back to the question which I desired to ask. Will your Honors tell me whether I can put the question?

Mr. BROOKS. You did put it and got an answer.

Mr. GREEN. Am I allowed to put the question?

The CHAIRMAN. Yes, put it.

By Mr. GREEN.

Q. Will you tell us, Mr. Main, what is the price at which the surplus is sold, referring to the surplus in excess of the 50 per cent. surplus, in Lawrence?

Mr. BROOKS. We object to it.

Mr. GREEN. I am asking for the selling price of that particular surplus.

The CHAIRMAN. Mr. Green, we would like to take this into consideration.

Mr. GREEN. I have no objection.

The CHAIRMAN. Go ahead on some other matter.

Mr. MATTHEWS. I would like to call your Honors' attention, while the question is under discussion, to page 366 of Vol. V., to a statement on that page made by the Chairman to Mr. Brooks, to the effect that he had satisfied the Commission that the conditions were substantially similar in Springfield to those in Holyoke, upon the testimony of Mr. Anderson. The statement is:—

"You offer to show the running value of water power in Lowell or Springfield, and that is admitted, provided you satisfy the Commissioners—and you have here upon the testimony of this witness—that the conditions were substantially similar."

I take it, of course, that the last statement does not apply to Lowell, that Lowell was simply thrown in by way of illustration by the Chairman; but it must apply to Springfield, which was the water power then under consideration. Now if there is similarity between the water power at Indian Orchard or Springfield and Holyoke, there is a great deal more similarity between that of Lawrence and that of Holyoke, and there is even, I might say, some similarity between the water power and the conditions surrounding its use at Lowell, because it appeared from the evidence of Mr. Anderson that the Indian Orchard Company was controlled by the United Electric Light Company of Springfield. So you have, perhaps, substantially the same conditions there as existed at Lowell.

Mr. GOULDING. Your Honors will observe that the comparative cost of steam and water was what that evidence had relation to. It was not putting in the price of power at Springfield, the price of water power at Springfield and at Holyoke, but on the distinct question of whether you could run an electric light plant by water as cheaply as by steam.

The CHAIRMAN. Before the Court passes upon these questions at all,—we have already passed upon Lowell,—we will take it under advisement, and examine the testimony more carefully.

Mr. MATTHEWS. I wish your Honors would do that with the Lowell case, too.

The CHAIRMAN. Yes; with both of them. We have got to for reasons I cannot state now. We have already passed upon Lowell.

Mr. BROOKS. That is the way I understand it.

The CHAIRMAN. I will leave it on the word *passed*.

By Mr. GREEN.

Q. Mr. Main, will you tell us what in your opinion is the fair market value of the 16 non-permanent mill power in Holyoke, appurtenant to 41,289 square feet of land, of which about 28,000 square feet can be built upon, of the shape of the lot in issue in this case?

Mr. BROOKS. I object to it, because I claim he has already testified to it.

Mr. GREEN. I say he has not.

Mr. BROOKS. All right. I withdraw the objection.

The WITNESS. In round figures I should say \$100,000.

The CHAIRMAN. What is worth \$100,000?

Mr. GREEN. I wasn't asking for the cash value, not for the fee simple ownership.

Q. I ask you, Mr. Main, what is the value of the 16 non-permanent mill power appurtenant to the 41,289 square feet of land, of which 28,000 square feet can be built upon, of the size and shape of this?

The CHAIRMAN. He said about \$100,000.

Q. Will you explain what you mean by that? A. I understood that you wanted me to tell you what was the cash price that could be paid for 16 mill powers of non-permanent water, to go with 41,000 square feet of land, of which about 28,000 square feet could be utilized for buildings.

Q. And what assumption as to rent? A. And that the water should be paid for at the rate of \$1,500 a mill power a year, and paid for as used. I beg your pardon. I didn't mean that. I will have to take that back.

Q. You have a right to have your schedule, your figures.

A. What I did mean to say, and what I did not say, was that there should be no rental paid; that that was the cash value, the sum to be paid down, and that there should be no rentals paid after that.

By the CHAIRMAN.

Q. That is, after the \$72,000 was paid down? **A.** The one hundred thousand.

By Mr. GREEN.

Q. The payment of \$100,000 in your opinion would give the perpetual right to draw the water? **A.** That is what I meant to say.

Q. I understood you to state yesterday, Mr. Main, that you thought somewhere in the vicinity of four mill power would be the natural amount of water to be used appurtenant to this piece of land? **A.** Four to five.

Q. Supposing, instead of making a cash valuation of the right to draw the water perpetually as appurtenant to this land, that the right is to be sold at an annual rent, the right to draw 16 mill power as appurtenant to the 41,289 square feet of land described as above, of which 28,000 square feet could be built on, and of the shape of this one, what in your opinion is the fair valuation of the rental?

Mr. BROOKS. I object to that. I don't think my friend means what that question asks.

Q. What is the fair price, the fair market price, to be paid as rental for the 16 mill power?

Mr. BROOKS. Before that question is put I think my friend will agree that it should be reformed.

The CHAIRMAN. Will you explain that, Mr. Green? You must remember that in the midst of so many questions we cannot appreciate them as rapidly as you can, perhaps, and you must be a little patient with us.

Mr. GREEN. The witness has just stated the value of this land and water power appurtenant, paying for it all down at once. Now I desire to know what in his opinion is the fair value of the water power in the form of an annual rental, if it is appurtenant to this particular piece of land.

Mr. BROOKS. What do you mean, what is the fair rental for it?

The CHAIRMAN. Let us take the answer, and perhaps we will understand it.

The WITNESS. I think the fair rental would be \$1,500 a year per mill power for the quantity drawn.

Q. That is four mill power, or whatever the quantity might be? A. Whatever might be drawn.

Q. Anything for the privilege? A. I think the privilege would have the value that it has as land.

Q. There is one slight error that I notice,—and I don't know as I should call it that. If you will examine your Schedule 25, the very last line, you may want to make a correction in the number of non-permanent power, Mr. Main.

By Mr. COTTER.

Q. Will you explain what you mean by the last answer, Mr. Main? A. I meant to say that there is a certain value which is inherent in the land.

Q. That is the land value, isn't it? A. The land value; that is all. The value of the land.

Q. The market value of the land? A. Yes.

By Mr. GREEN.

Q. It would have its value as land, and the water to be paid for the amount used, as I understand it? A. That is right.

Q. You are looking at Schedule 25 now? A. I am.

Q. Any change you desire to make? A. Opposite the electric light plant there is given 12 24-hour non-permanent powers. That should read 16.

Q. As I understand it, Mr. Main, all the valuations that you give up to the last two, that apply and depend upon the right to draw water, depend upon the fact that water could be drawn for use except a certain number of days?

Mr. BROOKS. I object to that.

Mr. GREEN. I will put it in the form of a question.

Mr. BROOKS. I didn't care about that. They show for themselves.

Mr. GREEN. Some of them may, and some may not.

Mr. BROOKS. Well, I withdraw the objection.

Q. With the exception of the cash valuation recently given and the valuation of the land as land, and the right to draw, measured, and the price paid for water drawn measured, and also with the further exception of the answer given to the hypothetical question stated to you yesterday, are your other valuations based upon an assumption of the right to draw, to use a certain amount of water? A. They are.

Q. How many days? A. Every day except 28 days in the year. That you would get it for every day except 28 in the year.

By Mr. BROOKS.

Q. 24 hours? A. Yes.

By Mr. GREEN.

Q. I presume there may be something I have overlooked. A. There is one question I would like to clear up a little, explain more fully. The question was asked me in Boston, what quantities I used in determining the costs of buildings, and so forth, and I answered my own. I would like to say that I figured these quantities all out, and where they agreed closely with the Company's figures I adopted their figures. Where they didn't, I took my own.

By Mr. MATTHEWS.

Q. Mr. Main, I want to ask you to identify the monthly sheets and other documents that you used for making your calculations of the average amount of water power used at the electric light station, with the exhibits that were put in by Mr. A. F. Sickman, in Vol. VI. of the testimony. I show you, for instance, Exhibit 77, and ask you to state how that compares, if it does compare, with any chart or diagram that you have testified about in your examination. A. It purports to be the special experiment on Wheel C at the electric light plant.

Q. It has curves on it, hasn't it? A. Yes.

Q. Are those curves similar to or identical with the curves

used by you, which you stated had been procured at the Company's office? A. I can't tell by looking at this now.

Q. Will you tell, by comparing them with the curved chart that you used? I show you Exhibit 160, which you used in your examination the other day, being Diagram No. 1, showing the relation between degrees and inches of gate openings and horse powers, and I recall to you that you stated, if I am not mistaken, that one of the curves on this chart, the 19.5 curve, was taken from some chart that you found in the office of the Company? A. It was.

Q. Now I ask you whether that chart is Exhibit 77, or one of the set of which Exhibit 77 is one? A. It is not this one alone.

Q. Not Exhibit 77 alone? A. The curve on Exhibit 160 represents the average horse power of all the four wheels at the electric light station. This Exhibit 77 purports to be the test on wheel C at the electric light station.

Q. My question was whether that is one of the charts you used to reach your 19.5 line in Exhibit 160? A. I am unable to say.

Q. I hand you Exhibits 80, 81, 82, and 83, put in by Mr. A. F. Sickman, in Vol. VI., and I will ask you what relation they bear to the records of measurements of water drawn at the electric light plant, which you used in your examination the other day? A. These exhibits are samples of records kept for the whole year ending June 1, 1898, and form a part of the records which I used in determining the average horse power and the average mill power used at the electric light station.

Mr. MATTHEWS. If your Honors please, before Mr. Brooks begins his cross-examination of Mr. Main, I should like to make an additional and new suggestion with respect to the admissibility of evidence of prices obtained for water power in Lawrence and Lowell, particularly in the case of Lawrence. In the first place, if the evidence is excluded it would be the first time, I think, in a water case where such evidence has been excluded. The Chairman's own experience

will suggest to him any similar case, if one exists. As far as my knowledge or recollection goes, such evidence is always admitted in water power or water supply cases,— in water power cases particularly. The other particular suggestion which I desire to press at this time is this: that possibly your Honors fail to appreciate the importance which we, the counsel for the City, attach to the evidence of what is actually paid in the city of Lawrence and in the city of Lowell for water power identical in character, as we contend, with the only sort of power that this Commission has the lawful right to compel the City of Holyoke to use, to run this plant with after it acquires it. We do not place so much stress upon the instance of Lowell, because that is complicated by the fact that was brought out by brother Brooks, that the water power is owned substantially by the persons who use it, and the prices that are paid are perhaps in a sense prices made by a person selling to himself. But that does not apply to Lawrence; and we attach great importance for the proper presentation and argument of our case, that the price paid in the city of Lawrence, the regular market price or value of surplus power, should be admitted in the evidence in this case. I do not know that the Commission fully appreciates the point, because it has not been elaborated by either side, and has, in fact, hardly been suggested until to-day, that it will be the duty of the Commission in determining this case to pass explicitly upon the question of law, whether they can force the City to take a lease of what the Holyoke Water Power Company calls non-permanent power or not. We say they cannot, and we consider that question perhaps the most important question of law in this whole case. If not, then we contend that all that the Commissioners can force the City of Holyoke to do is to take a lease by which it shall pay for water only as used. And we should even go to the extent of contending that if the Commissioners think that such a lease will be too one-sided, that the Company ought not to be bound unless the City is. In that event, the Commissioners would leave us without any right to water power at all. We would rather have this plant,— and in that phrase I include

the water plant as well as the electric light station itself,—without any right whatever to draw power, and throw it away, and run this plant by steam, than to be subject to a perpetual obligation to pay for this so-called non-permanent water power.

Mr. GOULDING. I rise to a question of order. My friend on the other side is not arguing the point of the admissibility of the Lowell or Lawrence evidence, but he is really giving a general argument of his theory of the case. And it is not fair, nor does it promote the progress of this case.

Mr. MATTHEWS. I may differ with my brother as to what promotes the progress of this case, but I am endeavoring to confine my remarks to an argument to show why this evidence is important. If the Commission doesn't care to hear it, all right.

Mr. GOULDING. We will admit that it is important to their view, to any extent they please.

Mr. MATTHEWS. Then I will conclude simply with this statement: It has been the practice of this Commission to allow either side to state that evidence of a certain character considered by them vital to their side, and such evidence has been allowed, subject to determination at the close of the case, with all the light that can be thrown upon it by that time, by all the evidence that shall be presented by either side. That was the course pursued in respect to the question of the admissibility of the earning capacity of the Company, and upon other occasions with respect to other kinds of evidence; and we ask that the same privilege be extended to us with respect to this evidence now under discussion, particularly that relating to Lawrence.

The CHAIRMAN. That is the last that was put in, wasn't it?

Mr. MATTHEWS. Yes, sir. Lawrence rather than Lowell.

The CHAIRMAN. On this question which the Commissioners reserved my attention has been especially called by Mr. Turner to a distinction here which he thinks should operate so that the one case should be excluded and the other

admitted; and he files this memorandum, to which the other Commissioners assent:—

“At Lowell the water power is owned by a company which is composed of the various corporations using the power.

“At Lawrence the water power is owned by a corporation owned by parties outside of the users; it is a commercial enterprise and similar to the Holyoke Company.

“The Lowell Locks and Canals Company is an association of users which does not pay dividends, simply assesses cost of maintenance and operation. The power in Lowell is unlike that of Holyoke.

“The question as to the market value of various kinds of power in Lowell we exclude for the above reasons. The market values of the Lawrence powers we admit.”

Now you can ask him with reference to the market value of powers at Lawrence.

Mr. BROOKS. We want an exception.

Mr. GREEN. For whatever it is worth, so far as the exclusion of Lowell, we have been saved, I believe, already; if we have not, we should like to be.

Mr. COTTER. Lowell is excluded for the reason that it is not similar.

Mr. GREEN. Very well.

Mr. BROOKS. We except to the admission of this for the same reason that the other was excluded, may it please your Honors.

The CHAIRMAN. You can ask him.

Q. Will you tell us what the going price is, the selling price, for the surplus in excess of the 50 per cent. surplus in Lawrence?

Mr. BROOKS. Do your Honors admit this testimony absolutely? I understood you to rule at some time that you would admit certain testimony *de bene*,—that is, that where it came to a question of the contents of a written instrument you would not admit that testimony absolutely.

The CHAIRMAN. I understand the evidence is admitted *de bene* upon the statement made earlier in the day—

Mr. BROOKS. I think that ought to appear in the record,

because your Honors' decision seemed to be an absolute admission of it.

Mr. MATTHEWS. Will your Honors state what the understanding is as to the provisions of the written instruments?

The CHAIRMAN. We have reserved the question as to whether that is legally necessary or not. If we find that it is necessary, we shall ask you to produce it, otherwise exclude this evidence. If not, we shall stand on this evidence alone.

Mr. MATTHEWS. I understand the present ruling of the Commission simply goes to the question of similarity of condition.

The CHAIRMAN. Yes, on the evidence.

Mr. BROOKS. You note an exception to all this.

Mr. MATTHEWS. May I ask the Commission, if it thinks that documentary evidence is necessary, whether it is prepared to state now whether we shall produce all the leases and contracts?

The CHAIRMAN. No.

Mr. MATTHEWS. Or a sample, or enough to show that water power is sold as a matter of fact in some cases?

The CHAIRMAN. No, we simply rule that we will consider all those cases and let you know.

Mr. MATTHEWS. On that particular point, of course, an expert giving an opinion may be permitted to state facts which are in the nature of hearsay or involve the contents of written instruments, whereas the facts themselves would not be admissible without the production of the written evidence.

Mr. GOULDING. This is not an expert question.

By Mr. GREEN.

Q. Will you answer the question?

Mr. BROOKS. This all goes in subject to my exception.

A. The charge for day surplus over 50 per cent. Is \$3 a mill power a day.

Q. For night? A. The charge for night power of any sort is \$1.20 a mill power a night, making the total for day

and night of \$4.20 a mill power for 24 hours, or for a year \$1,260 a mill power.

Q. And that is, as I understood you to say, paid for how?

A. Paid for as measured.

Q. Is anything else paid for it besides those rates? Is there any bonus paid?

Mr. BROOKS. This is all coming in subject to our exception.

A. There is no bonus paid for the surplus power.

By Mr. BROOKS.

Q. That is, neither for the 50 per cent. surplus or that over 50 per cent.? A. No.

Mr. GREEN. That is all.

Cross-examination by Mr. BROOKS.

Q. How many days of the year does this \$1,260 pay for surplus water? A. 300 days.

Q. 300 days. And you understand that by the lease that is offered to the City the City obtains how many days? A. That I am unable to tell.

Q. Very well. Well, it is every day except 28, isn't it? A. That is what I have assumed.

Q. Yes, and for those the City would obtain a rebate? A. For 23 of them.

Q. For 23 of the 28? A. Yes.

Q. Then the \$1,200 for the 300 days at Lawrence would be \$1,500 for the year at Lawrence? A. For 365 days?

Q. Yes. A. I have not figured that.

Q. Will you be kind enough to do it? How much would it be—I will change my question—for a year of 365 days at Lawrence? A. \$1,533.

Q. \$1,533 per mill power per year at Lawrence, considering the year 365 days? A. 365 days.

Q. And that is also upon a variable head and fall? A. It is, but there is an allowance made for the variation in the head and fall.

Q. An allowance at how much? A. For every foot, whatever it is.

Q. How does that affect your \$1,260? A. A mill power of water is so many cubic feet drawn on so many feet head, and if the head varies more, more water is supplied, and it gives practically the same power on the varying head until the head is wiped out, when you cannot run anything.

Q. What kind of wheels do they have to run at Lawrence with this variable head as compared with Holyoke? I mean on the First Level Canal and Second Level Canal at Holyoke. Larger wheels? A. They would be obliged to have wheels of larger capacity in order to run all the time.

Q. In order to obtain the surplus up to 50 per cent. the corporation desirous of obtaining it, and obtaining it, must be an owner of permanent power at Lawrence? A. It must, yes.

Q. What? A. Yes.

Q. Now, Mr. Main, is there any water power development that you know of with as constant a head and fall on the wheel as at the electric plant in Holyoke? A. Some of the mills at Lowell are situated between the two canals and are subject to the same rise and fall as between the first and second levels in Holyoke.

Q. Well, the electric light station is upon the First Level Canal. A. And in Manchester there are two levels, and the head between the first and second canal would be as uniform as it would be in Holyoke between the first and second.

Q. But the head and the fall at Holyoke at this electric light plant is much more constant, is it not, than in a majority of water power development? A. I should say that it was.

Q. Well, now, you say that you would value the 16 mill powers at \$100,000 at Holyoke? A. Cash value.

Q. Cash value; fair cash value? How do you arrive at that? A. In the first place I arrived at the value of \$50,000 as the value of the land and privilege with the right to draw 3.36 mill powers, paying at the rate of \$1,500 a mill power

a year. Now the cash value of the price of the water, which is \$4,653.60, is in my opinion a sum which is equal to the \$4,653.60 capitalized at 10 per cent., or \$46,536.

Q. What does that represent? A. That represents the cash payment which will offset the payment of water rates or rents. That, added to the \$50,000, makes a total of \$96,536, which I said in round numbers was about \$100,000.

Q. How much of a load do you have this 16 mill powers carry? A. 3.36 mill powers.

Q. Yes. That is, your valuation of the 16 mill powers is your valuation of the 3.36 mill powers that is used there? A. Average.

Q. Yes, the average. So that you say the value of the 16 mill powers is just the value of the 3.36 mill powers average load at this station. A. For this use, yes.

Q. Well, if you found use for the 16 mill powers by the growth of business or by the transmission to users of electrical power, you would boost your figures higher, of course, on the value of this water? That is true, isn't it? A. They would have to be modified, yes.

Q. They would have to be modified by their plus sign? A. Yes.

Q. And substantially all through your calculations of the value of the water power, and of the value of the rentals of water power, you have taken the 16 mill powers and said they were worth just 3.36 mill powers, the latter being the average load at this electric station? A. Yes, my values at the electric light plant are all based on the average load of 3.36 mill powers.

Q. Yes. And it is true that you value the 16 mill powers no more than the 3.36 mill powers in your various calculations? A. The two enter as factors into all of the calculations.

Q. It is true, isn't it, that your valuation of the water power development at this electric light station is upon the basis of 3.36 mill powers? A. Average power used; that is true.

Q. Yes, and you value the 16 mill powers no more than the 3.36 mill powers? A. With the use to which it is put I should answer, yes.

Q. That is the way I understand it. You say the value of the 16 mill powers here at this electric light station in Holyoke is worth no more than the 3.36 mill powers which carries the average load? Is that so? A. That is right.

Q. Now can you tell me, running back to Lawrence, what the number of the restricted days of surplus power is? Of course you understand what I mean? A. Yes, I understand.

Q. Above the 50 per cent. surplus. A. I do not think I can answer that now.

Q. Can you approximate it? A. I do not remember what the figure is.

Q. Did you take the restricted days into consideration in your statement of market value of surplus at Lawrence? A. No, not in this particular case.

Q. What do you say, Mr. Main, in your opinion, is the more valuable power,—that power that is offered by this lease, which is practically constant, not variable, or the power such as is at Lawrence?

Mr. GREEN. I object to that. It contains an assertion of the counsel as to what is in it.

The CHAIRMAN. You can change that by assuming that.

Mr. BROOKS. I don't know — I don't think I ought to assume it, may it please your Honors, with all due deference. I say that is the testimony.

The CHAIRMAN. Well, I know, but it saves discussion. Why don't you do it?

Mr. BROOKS. Well, all right; I will do it to save that, not because I believe in it.

Q. You have told me already that it was a practically constant head at Holyoke on the First Level Canal? A. I said it was fairly constant, yes.

Q. Well, you said practically constant, didn't you? A. No, I do not think I did.

Q. And substantially constant? A. I do not think I answered that way.

Q. Is it much more constant than the surplus over 50 per cent. at Lawrence? A. It is.

Q. Now, assuming that the head in Holyoke on the First Level Canal is much more constant than the head at Lawrence, which should you consider the more valuable water power?

A. Other things being equal, the one at Holyoke would be more valuable.

Q. Is not there a restriction in Lawrence of this surplus power about which you have been testifying of 100 days or more on an average? A. I think not.

Q. Out of 365 days in the year, are there not 100 days that the 24-hour surplus is restricted at Lawrence? A. I think if you took the Sundays and holidays out of the 100 that possibly you would be about right, but I do not remember what those days are now, although I have had them in my mind.

Q. Have you any data that would answer that question or aid you in the answering of it? A. I think so.

Q. You understand, do you not, Mr. Main, that the so-called non-permanent power at Holyoke, indentured non-permanent power, cannot be shut off? A. That is what I understand, until —

Q. You understand —

Mr. GREEN. You interrupted him. He has not answered fully.

The WITNESS. I had not finished my question.

Mr. BROOKS. I don't know that I need any question.

Mr. GREEN. He answered "until," and then was stopped.

Mr. BROOKS. Very well.

Mr. GREEN. Go on, Mr. Witness.

The WITNESS. Until there shall not be water enough in the river to supply these 16 mill powers, according to the opinion of the engineer of the Holyoke Water Power Company.

Q. Yes. But your understanding is, if there is water that it cannot be shut off? A. Not until — Certain other quantities have got to be supplied before that. If there isn't water

enough to supply those other quantities, why, this 16 mill powers would have to be shut off.

Q. You understand that the surplus over 50 per cent. at Lawrence can be shut off on notice at any time? A. It can be.

Q. Which should you consider the more valuable of the two? A. Why, in itself, the water that could not be shut off.

Q. That is, you would consider this non-permanent water that I have just inquired about the more valuable? A. Yes.

Q. Do you know how the demand for 24-hour power at Lawrence compares with the demand for that power at Holyoke? A. I can't answer that question.

Q. Would the demand, in your opinion, affect the value of the water power in the market? A. I think it would.

Q. What are the principal industries of Lawrence, — cotton mills? A. Cotton, woollen, and paper mills.

Q. To what extent paper mills? A. There is the International Paper Company at the foot of the North Canal, there is the Munroe Paper Company on the South Canal, and another one — I have forgotten the name.

Q. Do you know how much power those three paper mills consume? A. I do not.

Q. You do not? A. No.

Q. Can you tell me what percentage of 24-hour power is sold in Lawrence? A. I cannot.

Q. It is mostly 10-hour power, isn't it, that is sold in Lawrence? A. The majority of it is, I should say.

Q. A large majority? A. Well, I shouldn't want to answer that, Yes, because my opinion is that there is quite a large amount of 24-hour power sold there.

Q. Do you say that a very large majority of the power that is sold there is not 10-hour power? A. No.

Q. Will you say that it is 10-hour power? A. I don't understand the question.

Q. I say, will you say that a very large majority of the power that is sold in Lawrence is not 10-hour power? A. No.

Q. Is it 10-hour power, by a large majority? A. A very large portion of it is 10-hour power.

Q. The reverse of that is true in Holyoke, is it not? A. I should think it was.

Q. You don't claim to have any knowledge of electrical efficiencies, do you? A. Well, I have some general knowledge of it.

Q. When you were figuring upon the cost of power at the switchboard what consideration did you give to electrical efficiencies? A. I assumed that the loss of the electrical machinery was 15 per cent.

Q. You assumed that? A. I did.

Q. Both at Springfield and in Holyoke? A. At Springfield I assumed what Mr. Anderson said.

Q. Well, how much was that? A. The loss between the two switchboards was 15 per cent.

Q. You mean between the switchboard at Indian Orchard and the switchboard at Springfield? A. No, he said that loss was about 25 per cent.

Q. Oh, you mean the loss on account of the transformer? A. He said that the loss was in the station itself, between the two switchboards — was 15 per cent.

Q. Where did you get your 25 per cent. loss at Holyoke? A. 30 per cent., I used.

Q. 30 per cent. loss. How did you arrive at that? A. I added to this 15 per cent. what in my judgment would be the loss in friction in shafting and gears and belting.

Q. You made no attempt to discover what the actual loss was? A. We made some tests after I made up this report.

Q. Who made any tests? A. Why, both sides in this case were represented.

Q. Any electrical tests? A. Oh, no.

Q. Well, that is what I am getting at. You cannot tell what the loss is at Holyoke, can you? A. I can give my opinion, that is all.

Q. Now, as I understand your testimony yesterday, you say that in your opinion 16 mill powers of water could not be utilized in connection with the land that is offered to the City in this case for any other purpose than an electric light sta-

tion? A. So far as my knowledge is concerned, I should say so.

Q. What studies have you made of various industries to determine that? A. Textile mills and paper mills.

Q. Well, any further study of paper mills than what you testified to yesterday? A. The only further study that I made was to take the plan which was submitted and the schedules which showed the area of the land and the mill powers which went with each lot, and to find the average and the minimum number of square feet that were sold with each mill power.

Q. I ask you if you have made any further study of paper mills, and power application to paper mills, than what you have testified to yesterday? A. Only what I have just spoken of.

Q. And you stick to that answer now? In your opinion it can be only utilized for an electric light station? A. Why, I could imagine something that is impracticable, I think a very high building, so as to get a great number of stories and use up the power in that way.

Q. Is it unusual in cities to have power distributed over several stories for manufacturing purposes? A. It is not, no.

Q. Have you considered whether or not this might be used in the manufacture of electrical appliances? A. It could be.

Q. The 16 mill powers? A. I think not.

Q. How do you know? A. Not without going very high in the air with the building.

Q. Have you ever made a study of that subject? A. Not a special study.

Q. Have you ever built or planned concerns for the purposes of electrical manufacture? A. I have not.

Q. Is there, in your opinion, any difficulty in distributing this electrical power if anybody desires to? A. There wouldn't be, so far as I know.

Q. Did you consider that when you gave your opinion that the 16 mill powers could only be used for an electric light station? A. I didn't consider that.

Q. Do you know whether the 16 mill powers could be used for dye works and finishers, on this same site? A. It could not be.

Q. You say it could not be? A. I should say not; not practically.

Q. You speak of the paper mills and the mills of Holyoke. How much of the mill sites that are purchased by the various corporations are occupied by their manufacturing buildings?

A. I cannot answer that in percentages, but some of them are very much covered with the buildings.

Q. And some of them are very much not covered? A. That is true.

Q. And do each of the mills of Holyoke have auxiliary steam? A. I don't know whether they all do or not.

Q. Substantially all the mills? A. I can't answer that question.

Q. Don't you know from your inspection and examination that most of the mills of Holyoke have auxiliary steam? A. I cannot answer that.

Q. And use it the year through? A. I cannot answer that question.

Q. You have made no investigation with reference to that? A. I have not.

Q. Have you thought whether or not this site might, for instance, be used for electrical chemical processes? A. I have thought that it could be.

Q. Why didn't you tell us that yesterday? A. Didn't think of it then.

Q. And there are a great many of those, are there not, that this 16 mill powers upon this particular site could be utilized for?

Mr. MATTHEWS. I don't think the witness said that.

Mr. BROOKS. Don't think he said what?

Mr. MATTHEWS. What your question assumes.

Mr. BROOKS. I have assumed nothing.

The CHAIRMAN. Answer the question, Mr. Witness.

A. I should say, practically no.

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Q. Practically none? A. No.

Q. Well, could it be used for the manufacture of aluminum? A. I suppose it could be.

Q. And the 16 mill powers? A. I think possibly some sort of a building could be built there that could use up that power.

Q. And for storage batteries? A. It could be used for that.

Q. And for graphite? A. I don't know about that.

Q. And carborundum? A. I don't know.

Q. And then you agree that there are several of these processes that this land and the 16 mill powers could be utilized for? A. I don't agree to that. I think that I could build a building on there that would use the 16 mill power in a cotton mill or woollen mill or something of that sort, but nobody would think of doing such a thing.

Q. Well, I didn't ask you that, did I? I understood you to tell me a little while ago that you thought this could be utilized, and you forgot to mention it yesterday, for several electrical chemical processes? A. No, sir; I didn't intend to answer you in that way at all. You asked me if I thought it might be used for chemical processes.

Q. Well, you say yes, don't you? A. I didn't mean to say that I thought that it would be or could be used for that; I meant I thought of that process.

Q. And you told me you didn't mention it yesterday because you didn't think of it? A. Didn't think of it yesterday.

Q. And you claimed yesterday it couldn't be used for any purpose except for an electric light station? A. So far as my knowledge went.

Q. And for the electrical process manufacture, if I may so term it, a one-story building could be utilized there and have 16 mill powers applied to it? A. I am not able to answer that.

Q. You cannot say? A. No.

Q. Did it occur to you that the surplus electricity might

be sold to street railways, either at Springfield or in Holyoke?

A. I had not considered it.

Q. And you gave that no consideration? A. I did not.

Q. What do you say about it now? A. I don't know whether it could be or not.

Q. There isn't any question in your mind but what there is area enough to manufacture electricity to the extent of the full utilization of this 16 mill powers? A. There is no question in my mind as to that.

Q. I understand that in your Schedule 25, where you have given the Holyoke Water Power Company's power as 12 24-hour powers, you have corrected that to 16 24-hour powers?

A. Yes.

Mr. BROOKS. That was done while I was gone.

Mr. GREEN. If you don't object I will have that changed right on his schedule, and then it will be all apparent.

Mr. BROOKS. Certainly, that is all right.

Q. Did you make any examination of the leases of these various companies that are specified in your Schedule 25, except the George R. Dickinson? A. That is the only one.

Q. In any of your schedules showing the cost of steam power, have you allowed anything in the annual cost for expenditure for condensing water or for feed water purposes? A. I have not.

Q. You have assumed that that would be free? A. I have.

Q. Why? You have assumed that upon the basis of the ideal plant that you would locate up the river a mile and half?

A. I have.

Q. And obtaining the water from the river free? A. Yes.

Q. Supposing you located your plant right down there at this electric light station, and were compelled to pay for condensing and feed water, would it in your opinion be prohibitive of your condensing or compound condensing plants? A. That would depend upon the price you had to pay for it.

Q. Supposing you had to pay the city price for water? A. It would be.

Q. In your Schedule 13 you located your steam plant on the particular site that is here offered by the Holyoke Water Power Company to the City, did you not? A. Yes.

Q. And you allow nothing for the expenditure for condensing or feed purposes there? A. No.

Q. That is, when it came to the possible expenditure for condensing or feed purposes for your engines, you at once took into consideration your ideal plant located a mile and a half up the river? A. When I took into consideration the use of condensing water and feed water free in Schedule 13, I did not consider the plant at all up the river.

Q. Very well. Where were you to get your water free for condensing and feed purposes? A. I understand that —

Q. Well, I am asking you where? A. From the canal.

Q. That is, you assumed that the Holyoke Water Power Company would give the City water for condensing and feed purposes? A. I did.

Q. Of course, if you were compelled to pay the Holyoke Water Power Company, assuming that you ran by steam, for condensing and feed water, that would enlarge your steam expenses very considerably, wouldn't it? A. Yes, it would enlarge both, on both sides of the equation somewhat.

Q. Well, it would enlarge it very much more on the one side of the equation than on the other, wouldn't it? A. That is right, yes.

Q. Now that makes me think. Where is this lot of land that you erect your ideal structure on which you use in obtaining the valuation of the present plant? A. It is located between the Boston & Maine Railroad and the Connecticut River.

Q. Do you say about a mile and a half from the dam? A. About that, yes.

Q. Who pointed that out to you? A. Mr. Kirkpatrick.

Q. Who owns it? A. I don't know.

Q. Does it go by any name? A. It does.

Q. What is the name of it? A. I don't remember who he said owned it.

Q. Very well. Did he point out more than one tract? A. Yes, we drove round half a day and saw a number.

Q. Well, this is the favorite ideal location? A. That is the one that I thought was better than all the others.

Q. And that is the one on which you erect your structure, your mental structure, which you used by comparison in obtaining the valuations that you have testified to? A. It is.

Q. Now I see you are turning the leaves of your book over. Can you give me the name of that plot now? A. That is what I was going to see if I could find. It is located about 6,000 feet in a straight line from the dam, above the dam, and is just beyond the foot of Cornell Street, and Mr. Kirkpatrick said it belonged to the Jones heirs.

Q. Now will you look at this map of Holyoke, which has been already introduced in the case and marked as an exhibit, and tell me whereabouts on that map you should say this tract for your ideal structure lay? A. Down in here.

Q. Just make a mark there. (The witness marked the plan as requested.) The place that you designate as the spot for the ideal structure which you use in comparison to obtain your values is the place just marked by you in pencil? A. It is approximately there.

Q. How did you arrive at that land in going from the city? How did you get to it? A. The way we got to it —

Q. By boat? A. — Was to drive down there.

Q. How did you drive? Is there any railroad crossing? A. We didn't drive across the railroad.

Q. Didn't you go over on to the tract? A. I think I did not.

Q. Well, there is no way of getting to it, is there, except by boat, or by crossing the tracks of the Boston & Maine Railroad? A. You would have to cross over or under the tracks of the Boston & Maine Railroad.

Q. Is there any highway leading to it, or any highway in that vicinity? A. Not very far away.

Q. Well, is there any street of the city of Holyoke within

half a mile of it? A. I don't know whether the streets are accepted up there or not. We were not half a mile away.

Q. Well, I understand you didn't get on to the tract, you were on some other land? A. I didn't cross the track. I saw the land from the other side of the railroad.

Q. Do you know how far the water rights of the Holyoke Water Power Company extend up that river? A. I do not.

Q. Did you take into consideration, when you assumed that you could get your water free, that the Holyoke Water Power Company had any rights there that would prevent that? A. I did not take that into consideration.

Q. Did you know that this very land belonged to the Holyoke Water Power Company and was leased to the Joneses? A. I did not know that.

Q. Would that make a difference in the location of your ideal structure which you used in the computation of valuations you have given in this case? A. I think it would.

Q. And a very large and considerable difference, wouldn't it? A. Yes.

Q. It would mean really the disruption of them, all, wouldn't it? A. Would have to get some other site.

Q. In Schedule 23, which I think is entitled "Cost of 500 horse power of steam power, using compound condensing engines, with a steady load 10 hours a day, 306 days in the year,"—is that proper? A. Yes, sir.

Q. Have you allowed in your calculations there anything for insurance, liability insurance? A. I think I have, yes; boiler and fire insurance.

Q. I asked about liability insurance. A. No liability; no.

Q. Have you got anything in that calculation for legal expenses? A. I have not.

Q. Why not? A. Because I haven't considered that the latter entered into the cost of steam power.

Q. Do you consider that it enters into the cost of water power in any of your calculations? A. I have not.

Q. Either liability insurance or legal expenses? A. I have not.

Q. You say in none of your tables have you included in the cost of water power the yearly cost of water power or of steam power, either liability insurance or legal expenses? A. I have included them in the total running expense of the station in one schedule.

Q. Why didn't you include them here, in your 500 horse power? A. Possibly there should have been an allowance for liability insurance.

Q. There isn't any doubt about that, is there? A. But the other thing I never considered before, never thought of it, never thought it entered into it.

Q. But on your 500 horse power basis you are running this station, aren't you? A. No; this is an independent calculation, showing the cost of producing 500 horse power, without any reference to this station or any other station.

Q. Why did you take 500 horse power? A. Because I was asked to make this calculation.

Q. Hadn't you any notion of why you were asked to make this calculation? A. I think so.

Q. What was it? A. Similar calculations were made by some of the experts on the other side, 500 and 200.

Q. Would that be about the peak load on this station? A. It is approximately that; yes.

Q. Did it occur to you that you were asked to run this station at 500 horse power upon the theory that that was the peak load? A. It did not.

Q. If you were going to run this station with 500 horse power you should have included both liability insurance and legal expenses, shouldn't you? A. I think —

Q. Isn't that so? A. Possibly that is true, that the power should bear its proportionate part of those two.

Q. You refer in Schedule 24 to the cost of 200 horse power of steam power? A. Yes.

Q. Using compound condensing engines, steady load, 10 hours a day, 306 days in the year, and you make the same omissions as in Schedule 23, do you not? A. I have.

Q. Was Schedule 22 admitted in evidence yesterday?

Mr. COTTER. I think it was.

Q. Your Schedule 22, which was admitted in evidence yesterday, was a statement of your opinion of the value of 16 24-hour non-permanent mill powers for paper mills, was it? A. Or any other mill that used power 24 hours a day.

Mr. COTTER. I think we suggested an amendment to that, by striking out "paper mill."

Q. But you applied this to paper mills, didn't you? A. I think you will find in my testimony in Boston that I said, "used 24 hours a day for any purpose," and as an example I used a paper mill, or words to that effect.

Q. This schedule was made up with a very close applicability to paper mills, and no others? A. It was.

Q. What other mills than paper mills would you have that Schedule 22 would apply to? A. I think it would apply equally well to a cotton or a woollen mill that ran 24 hours a day.

Q. Would you have the same calculations, the same items of calculation, if you were going to apply your 24-hour power to a cotton or a woollen mill, that you have in this Schedule 22? A. I don't know of any reason why I should change it in any particular.

Q. How about the load? Would the load be as steady? A. I think it would.

Q. In a cotton or a woollen mill as in a paper mill? A. Yes.

Q. Don't you know it is a fact that the steadiest of all loads is the load in a paper mill? A. The load in a cotton mill —

Q. Excuse me a minute. Just answer that question. Isn't the steadiest of all loads the load in a paper mill? A. I think not.

Q. Have you ever said that it was? A. I can't say that I have given enough study to the variation of load in a paper mill to say that it is more or less steady than in a cotton mill, absolutely, but my opinion is that the load in a cotton and woollen mill would be fully as steady as that in a paper mill.

Q. Do you recall how many tons of coal the Water Power Company purchase a year? Do you know it is something like 10,000 tons? A. For the gas and electric light?

Q. Yes. A. I don't know. I haven't listened to the gas testimony at all.

Q. Didn't you make an investigation when you were at the Holyoke Water Power Company's office, and determine that their purchase of coal amounted to 10,000 tons per annum?

A. I don't know that I did. I should think it might be that, though.

Q. Do you know of any users of coal in the city of Holyoke greater than the Holyoke Water Power Company? A. I do not.

Q. Did I understand you to say that you visited the water power plant at Indian Orchard? A. I did.

Q. When? A. One day when court was in session, about a year ago. It was in the winter time.

Q. How long an investigation did you make of it? A. I didn't stay there very long.

Q. Half an hour? A. About half an hour to an hour.

Q. Now, calling your attention for a moment to your schedule, with reference to Mr. Anderson's comparison. A. 21?

Q. Page 40, I think. I don't know what the schedule number is, but the schedule that you referred to in giving your testimony with reference to Mr. Anderson's figures. A. Yes. My schedule was 21.

Q. That was not admitted in evidence, but you used it? A. Yes, sir; part of it.

Q. In giving your testimony? A. Yes, sir, part of it; yes.

Q. What allowance in the cost of the power at Springfield did you make for an auxiliary steam plant in the figure that you gave as the expense of power at Springfield, amounting to \$2,048.70? A. That was not included at all.

Q. Did you include that? A. That was not included at all.

Q. What allowance did you make for the second station at Springfield? A. That was not included at all.

Q. It should have been, shouldn't it, if a second station at Springfield were necessitated by reason of the transmission of the power from Indian Orchard? You should have included the interest upon that expense, shouldn't you? A. I should have if I included it also in the other calculation, which I made with reference to the Holyoke plant.

Q. There are no two stations requisite there at Holyoke. This second station, you understand, don't you, is necessitated at Springfield by reason of the transmission of this power for a distance of eight miles? A. I understand that; yes.

Q. Why didn't you include interest on that additional investment? A. Because that corresponds to the station at Holyoke.

Q. What corresponds to the station at Holyoke? A. The station here corresponds to the station at Holyoke.

Q. Is there more than one station at Holyoke? A. No.

Q. There are two stations here in connection with the Springfield electrical plant? A. Yes; and one is taken into account.

Q. Why didn't you take the other into account? A. I should, if I had taken the station at Holyoke into account.

Q. You didn't take the station at Holyoke at all into account? A. No; not in either place.

Q. Where did you obtain the loss of transmission of 150 at Springfield? From what source did you obtain that? A. From Mr. Anderson's testimony.

Q. What do you understand that loss in transmission represents? A. It represents, as I understood it, an addition to the cost of power produced at Indian Orchard when it was received at Springfield on account of the loss in transmission.

Q. That is, you understood that comprehended the entire loss in transmission between Indian Orchard and the switch-board at Springfield? A. I did.

Q. I see you have an item of expense of \$760 fixed charges for the Springfield plant? A. Yes.

Q. From what source did you obtain that figure? A. That also came from Mr. Anderson.

Q. Did that come in his statement of the total expense for power of \$2,617? A. It came in his total expense of power of \$2,048.70, which he afterwards corrected and made \$2,617.

Q. And you took the first estimate rather than the last estimate? A. No, I beg your pardon. When I made the comparison I took the largest one that he made.

Q. Do you say that \$760 interest fixed charge was taken from the estimate amounting to \$2,617 that he gave? A. No, it was not.

Q. Then that was taken from the — \$2,048? A. Yes, I think there is a misunderstanding between us now.

Q. Well, I do not know that there is.

Mr. GREEN. Just state. If there is no objection, let Mr. Main state.

A. These items — I will explain why they were put down here and what I used when I get through.

Q. I see you have under the Holyoke expense in your comparison with the Electric Light Company's expense at Springfield, \$159.69, — that comes under your maximum mill power, — and you have said that this was given by Mr. Charles A. Allen, Vol. V., page 21. A. Yes.

Q. Do you insist that that is correct as you have stated it? A. I think so.

Q. Shouldn't it be 1-16 of that \$159.69?

Mr. BROOKS. (To counsel for the City.) Will you give him Vol. V., page 21?

Mr. MATTHEWS. Here it is. What page?

Mr. BROOKS. Page 21 he said yesterday.

The WITNESS. I think you are right, Mr. Brooks.

Q. So that \$159.69 that you would have as a portion of the yearly expense for water power at the Holyoke station which you used in comparison with Mr. Anderson's figures, instead of being \$159.69, should be 1-16 of that, or how much? A. About \$10.

Q. That would reduce, then, the yearly expense at Hol-

yoke which you use in your Anderson comparison \$149? A. Yes.

Q. Do you know the number of restricted days at the Indian Orchard plant of the Springfield Electric Company?

A. I do not.

Q. Did you understand that it was only freshet water that they have the right to use? A. I did not.

Q. Have you made any investigation to determine what the character and kind of the water is that is used by this United Electric Light Company at Springfield? A. I have not.

Q. You have capitalized at 5 per cent. throughout? A. With one exception — one or two exceptions.

Q. Well, with only one exception you have capitalized at 5 per cent.? A. I think there was one other place; I do not remember where that is now.

Q. Well, what was the exception that you refer to? A. The exception that I refer to now is the one where I gave the cash value of the privilege and right to draw water.

Q. Where did that appear?

The CHAIRMAN. That was capitalized at 10 per cent.

Q. Oh, yes, that was this morning? A. Yes.

Q. That is the way you reached your \$100,000 conclusion? A. Yes.

Q. I want to get page 35, Mr. Main, of your "first edition." What is that schedule — "Cost of Power and Gross Earnings"? A. Schedule 18.

Q. You figured, as I understand your testimony, that the excess of expenditures at the Holyoke plant above 60 per cent. of income was \$1,235.83.

Mr. GREEN. Where is that, Mr. Brooks?

The WITNESS. That is Schedule 19.

Mr. BROOKS. I do not know whether that schedule is in evidence or not, but that was the testimony.

The WITNESS. Did you say one thousand?

Mr. BROOKS. \$1,235.83.

The WITNESS. \$1,237.83.

Q. \$1,237, it should be? A. Yes, sir.

Q. And you say that in order to bring your expense down to the 60 per cent. of gross income, the charge for water must be lower? A. Yes.

Q. Is that the only way you think of? A. That is right.

Q. You do not think of any other way of lowering—any other way to bring the expense down to the 60 per cent.? A. Well, I was considering nothing but water power.

Q. Yes. Well, wouldn't it be a good way to bring it down to 60 per cent. of gross income to increase the amount of gross income? A. When you do that you might increase your running expense at the same time.

Q. You would not increase it in any such ratio? A. You ought not to.

Q. No. Well, then one good way to bring down the expense to 60 per cent. of the gross income would be to increase the gross income? A. I should think that would be a desirable way to do.

Q. Yes. That is, if the business were extended, thus increasing the gross income, more lights were inserted, more power used, you might bring it down to 60 per cent. of the gross income for expenses? A. I think it could be, probably, if the business was extended far enough and the running expenses kept down properly.

Q. Do you know anything with reference to the needs of the city for additional lights in its streets? A. I do not.

Q. Did you take that into consideration at all in making up any of your calculations? A. I did not.

Q. Where do you obtain the amount of your liability insurance and boiler insurance and legal expenses that you have inserted in the various schedules that have been put in evidence through you? A. I think I took the liability insurance and the legal expense from the testimony. I meant to have looked that up.

Q. You took that from the testimony? A. I think so.

Q. From whose testimony? A. That I do not remember now. I intended to look that up—

Q. Wasn't it Mr. Chase? A. No, because this was made long before he testified.

Q. What the actual legal expenses were or what the liability insurance was you do not know? A. No, we shall have to assume those.

Q. I desired to run through this schedule before I took up another branch of the case that I intend to go into. I see that in your cost of power and the gross earnings with reference to which you have testified, you say "Total expense on plant, not including interest." That is, in considering the gross earnings as related to the cost of power you do not include interest on plant? A. I did not.

Q. And your 60 per cent. that you consider in your allowance of expense you take from some one else, don't you? A. I took that from the testimony of —

Q. Mr. Prichard? A. Mr. Prichard, Mr. Humphreys, and Mr. Robb.

Q. You personally have no knowledge with reference to the proportion of expense to gross earnings? A. No.

Q. Of an electric plant? A. No.

Q. You have made certain allowances, for instance, for oil and waste and supplies? A. Yes.

Q. And your allowance for oil was how much in any one of your calculations of the cost of operating a water power plant? A. Any one?

Q. Yes. A. \$250.

Q. And that was for the wheel plant alone? The water wheel plant alone? A. It was.

Q. That did not include oil for dynamos nor any other mechanisms of the water wheels — the water wheel plant? A. Water wheels, gears, and shafting through the tunnel to the dynamo building.

Q. That is, it included no expenditures for oil after the power was delivered in the dynamo building? A. It did not.

Q. Where did you get that figure? A. That is my judgment.

Q. Did you make any examination of the Water Power Company's records to find what their actual expense was for oil? A. I did not.

Q. How much of this \$250 expenditure for oil would be spent upon the wheel? A. I cannot tell you.

Q. About how much? A. I cannot divide it.

Q. Half of it? A. I cannot divide it.

Q. Have you any notion how much was spent for oil in the dynamos and the interior shafting? A. I have not.

Q. You made no calculation with reference to that? A. No.

Q. If you found that the total expenditure for oil in that whole plant for a year was only \$180, you would want to cut down this \$250 to \$25, wouldn't you? A. This includes also supplies.

Q. The \$250? A. It does.

Q. What supplies? A. Any small supplies that might be needed for the wheels.

Q. Well, how much in amount? A. I do not know. I have not sub-divided it.

Q. Well, what would they need? A. Any small repairs; small parts.

Q. You have covered your repairs in another item? A. That is general repairs, yes.

Q. Can you tell how much of this \$250 covers repairs and supplies and oil? A. That was my general—my opinion from my general knowledge, that that was a fair amount to be charged for those items.

Q. But you have it for oil alone in your schedule, do you not? A. No.

Q. What is that number? A. 13.

Q. You have made no division and sought to make no division? A. I have not.

Q. And you can make no division? A. I cannot.

Q. I understood you to say in your testimony that the wheels were actually producing, for the month of June, 52 horse power per mill power at this electrical plant. Am I correct? A. I do not remember that I said that,—for the month of June.

Q. That is the way I took it. Did you say the average for the year? A. Yes.

Q. 52? A. No—

Q. On what gate opening? A. It was not 52.

Q. That was the way I took it.

By the CHAIRMAN.

Q. 54, wasn't it? A. It was about 54½.

Mr. GREEN. Page 18, Schedule 10.

By Mr. BROOKS.

Q. Then you say that you averaged the wheels for the year as producing 54 horse power per mill power? A. That is the result that is obtained from the average horse power and the average mill power for the year. I did not assume that figure.

Q. No, but you obtained that average? A. I did.

Q. What gate opening? A. At the various gate openings that the wheels were running at the time the records were taken.

Q. Exactly. That is, they were running at different openings? A. Yes, sometimes they were—

Q. With a 20-inch opening what would a wheel produce? A. In power or efficiency?

Q. In power. How many horse power per mill power with a 20 inch opening? A. It would be somewhere between 65 and 70; about 65 horse power at 75 per cent. efficiency.

Q. So that these wheels up there with a gate opening of 20 inches would produce somewhere from 65 to 70 horse power per mill power? A. They should.

Q. And at an 18 inch opening, substantially 66 or 67 horse power per mill power? A. Well, I can give you that accurately if you want it.

Q. Well, I don't care about being very accurate about it. Would I be correct in that? A. Nearly so; yes.

Q. From 67 to 68 horse power per mill power with an 18 inch gate opening? A. I should say so.

Q. With a ten inch gate opening what would be the production of horse power per mill power?

Mr. GREEN. What head are you talking about? I didn't hear in your original question.

Mr. BROOKS. 20 feet.

The CHAIRMAN. Well, he was only asking approximately.

Q. I don't care for absolute accuracy. Doesn't your diagram tell that? A. No. I thought it did.

The CHAIRMAN. About 50 per cent.?

The WITNESS. It would be more than 50 per cent.

Q. It would be more than that? A. Roughly, I should say between 50 and 55.

Q. So that it comes down to this, doesn't it, that, if the full production is called for by the business, these wheels will produce somewhere from 65 to 70 each — 65 to 70 or 71 horse power per mill power? A. If they could be run at a full gate opening all the time.

Q. That is what I say. A. They would produce somewhere between 65 and 70 horse power per mill power.

Q. That is, if the business was such as called for a full gate opening they would produce, their full efficiency, anywhere from 65 to 71 horse power per mill power? A. 71 is getting a little high.

Q. Well, call it 70. I don't care. I will give you a horse power. A. Yes.

Q. Your steam plant, the present steam plant of the Hokyoke Water Power Company at its electrical works, will produce how many horse power? A. The engines are rated at 800 horse power.

Q. I didn't ask really for the rate. Perhaps you are coming to what I want. A. And can be run to 1,100, I should say, easily.

Q. And more, can't they? A. Could be run for 1,200.

Q. Now these engines, then, are more than equivalent to 16 mill power? A. When they are overloaded 50 per cent. They are.

Q. Do you mean that in just the sense you use it — overloaded? A. Yes, I mean that in that sense. I mean when they are loaded 50 per cent. above their rating.

Q. What is the rating? You mean 400 horse power each? A. Yes.

Q. Now is it anything impracticable or unpractical to run these engines to 1,200 horse power? A. It can be done easily.

Q. So that under ordinary conditions these engines are more than an equivalent for 16 mill powers of water? A. Well, I don't call those ordinary conditions.

Q. Well, I don't want, of course, to split hairs with you on the word "ordinary." They are equivalent to 16 mill power of water, aren't they? A. They can be run up to 16 mill powers of water.

Q. And with safety? A. And with safety.

Q. And there would be no overstrain of the engine? A. I think not.

Q. The diagrams which you have numbered 2, 3, 4, and 5 respectively, and which have the exhibit numbers of 167, 168, 169, and 170, which are supposed to represent the average loads at the station, if I am right about it, you consider correct? A. I think they are approximately correct.

Q. Well, what do you mean by the word "approximately"? How many per cent. away from correct? A. I think that, if anything, they show a little larger load than there is on the station.

Q. I didn't ask you that, did I? I asked you how many per cent. away from correct. A. I don't think they are more than 2 or 3 per cent. out of correct.

Q. Will you look at your diagram 4, as you have numbered it, which is your plotting of the average loads for December, January, and February at the station? A. Yes.

Q. What was the average total load for December, 1897, and the average total load for January, 1898? A. December?

Q. Yes, 1897. A. 213.58 horse power for the hours run.

Q. 213 and how much? A. 213.58.

Q. For the month of December? A. Yes, sir.

Q. What was it for the following month, January, 1898? A. 214.1. I put it down in Schedule 10 as 215.

Q. So that you have the average load for the month of

December less than the average load for the month of January?

A. One horse power.

Q. Well, it is less? A. It is less by one horse power.

Q. And you are satisfied of the accuracy of your two averages, are you? A. I think so.

Q. Have you had any experience in electric lighting stations to discover when the largest load comes, what month in the year? A. Not in electric light stations.

Q. Does it occur to you that a larger average load comes in the month of December than in the following month of January? A. I should say that they ought to be almost exactly alike. The length of days—

Q. Well, that was hardly my question. I asked you if you had made any investigation to discover whether or not the larger load came in December or in January in electric lighting plants usually? A. I have not.

Q. Now I notice in your chart or diagram No. 2 of average loads that in the month of August, for instance, there is a long distance, seemingly a long distance, between white spots.

A. Is it near twelve o'clock?

Q. No, four o'clock in the morning. A. Yes. I can explain that.

Q. Well, I was going to ask you to. A. I found in some of the months that there were no readings, and I found that some of the notes said that the wheels were still at a period between half an hour before sunrise and a half an hour after six o'clock; but instead of putting that down to the line of no load, I assumed that the wheels were running always, between half an hour before sunrise and six thirty, at a load of about 50 horse power, although I found some readings that said that the wheels were shut down.

Q. And that is true substantially all through these various diagrams, isn't it? A. It is not.

Q. Well, take the diagram, for instance, of May, 1898. A. It is true there.

Q. Now looking at your diagram No. 2 of average loads, you took that at 60 horse power, didn't you, between the hours of four and six thirty? A. 50.

Q. It is 60 on our blue print. A. A little over 50; I shouldn't say it was 60.

Q. That is for the month of August, 1897. Will you look at the month of May, 1898? A. I beg pardon. I was looking at another one.

Mr. GREEN. What is the month?

Mr. BROOKS. Diagram 2, month of August, 1897.

The WITNESS. The month of August is very nearly 60, yes. There is one reading there.

Q. What did you take it in the month of May, 1898? A. 30 horse power.

Q. Why did you make that difference between August, 1897, and May, 1898? How does that come? A. Well, there isn't any reading shown there.

Q. There shouldn't be any difference, should there? A. I will have to look at these large ones.

Q. Well, I am taking your blue prints. A. Well, those are so small.

Q. There shouldn't be any difference between August, 1897, and May, 1898, should there? A. Yes.

Q. Where do you get it? A. In May, 1898, there were two readings.

Q. They don't show on your blue print. A. No, they do not. You will have to refer to these—these large exhibits—to get the thing accurately. There were two readings, which showed the power to be about 30 horse power, and there were three readings that showed the wheels as not running at all; but I threw out those times, and continued the line right across and gave the benefit of the doubt to the station.

Mr. BROOKS. That is all.

(Adjourned to Monday, March 18, 1901, at 10 A.M., at Boston.)

FIFTY-NINTH HEARING.

BOSTON, Monday, March 18, 1901.

The Commissioners met at the Court House at 10 A.M.

CHARLES T. MAIN, *resumed.*

Cross examination by Mr. BROOKS, continued.

Q. Running back, Mr. Main, to Lawrence, the cost of day surplus at Lawrence is \$4, is it not? A. Up to 50 per cent.

The CHAIRMAN. What per cent.?

Mr. BROOKS. I suppose he means that in Lawrence they may use surplus power at \$4 to the extent of 50 per cent. of the permanent power that they have.

Q. Is that it? A. That is right.

Q. And that is day surplus? A. It is.

Q. No surplus is sold at Lawrence or rented at Lawrence except to so-called permanent power users or lessees? A. There has been.

Q. Well, I am asking you with reference to January, 1898.
A. Not that I know of.

Q. And, if a person who pays \$4 for his day surplus desires to add to it night surplus, how much does his power cost him at Lawrence per horse power?

Mr. GREEN. That is 50 per cent. surplus, I take it, Mr. Brooks?

Mr. BROOKS. Yes.

Mr. GOULDING. Per mill power.

Mr. BROOKS. Per mill power. Did I say per horse power?

The CHAIRMAN. Yes.

Mr. BROOKS. I should say per mill power.

The WITNESS. \$5.20.

Q. So that under those circumstances a 24-hour surplus power would cost \$5.20 at Lawrence per mill power? A. Yes.

Q. And per day? A. Yes.

Q. Mr. Main, is there any manufacturing concern doing an active manufacturing business that you know of that has water power developed in available quantities that has ever discontinued the use of water power, and replaced it with steam power? A. Yes.

Q. Where? A. The Arlington Mills at Lawrence have done away with the use of their water power. The Hollingsworth & Whitney Paper Company, on Charles River, have done away with the use of their water power.

Q. Where? A. The Hollingsworth & Whitney Paper Company, Watertown.

Q. Watertown, N.Y.? A. No, Massachusetts. Those are the only two that I know of.

Q. Now, the mill you speak of at Watertown had no such water power as this at Holyoke?

Mr. GREEN. Is it worth while to go into the details of this?

The CHAIRMAN. Let him answer the question.

A. It is very much smaller than the water power at Holyoke.

Q. Wasn't the head very small? A. It was not very large.

Q. Well, wasn't it very small? A. I think it was somewhere around 10 feet.

The CHAIRMAN. I don't think it is worth spending much time upon that.

Mr. GREEN. He has spoken of two instances.

Mr. BROOKS. I understand that. I am going to get him down to one in a moment, if I can.

The WITNESS. I think it was about 10 feet.

Q. And it was a variable head, wasn't it,—a very variable head? A. It varied with the flow of the Charles River, which is variable.

Q. Well, those are the only two instances that you now recall where water power has had a steam power substitution, where water power was developed in available quantities? A. Yes, that is, where the mills own their own water power.

Q. Is there any mill that you have ever constructed, or of which you have been engineer, that has substituted steam

power for water power, where water power had been developed in available quantities? A. Yes.

Q. Where? A. At the Pacific Mills.

Q. What do you mean by that? That they did away entirely with water power? A. No, they did away with part of it.

Q. And they had a steam auxiliary? A. Yes.

Q. And that was at Lawrence? A. It was.

Q. And that was because there was no head at times upon the wheels of the Pacific Mills? A. No.

Q. What was the reason? A. Because it was cheaper for them to run by steam power than to pay for surplus water.

Q. For surplus water? A. Yes.

Q. Was that the only reason? A. That was the only reason.

Q. They discontinued nothing but the surplus water? A. That is all they discontinued.

Q. I think I asked you the other day — I have not seen the testimony since — with reference to the character of the water power at Lawrence as compared with the water power at Holyoke? A. You asked me some questions, yes.

Q. This was ten-hour power at the Pacific Mills, wasn't it? A. We used it about ten hours.

Q. That was the power that you discontinued — A. Yes.

Q. — was ten-hour power? A. Twelve hours.

Q. Twelve hours. Is there any other instance that occurs to you of any mill that you are the engineer of, or were the engineer of, or which you constructed, that had water power in available quantities that did not continue to use water power?

A. That is the only one that I constructed or was engineer of that I can say has discontinued the use of water power.

Q. Now, Mr. Main, is it a fact that in the past ten years there has been a much larger water power development in the United States and Canada than in the previous fifty years?

A. Well, I don't know as I could make that comparison. Water power has been developed to a great deal larger extent in the last ten years than previously.

Q. Yes. Do you know of any electric light plant that has

had in connection with it water power developed in available quantities that has discontinued it in favor of steam? A. I do not.

Q. Do you know how many of the electric light stations in New England are run by water power? A. I do not.

Q. Do you know what proportion of the electric light stations in New England are run by water power? A. I do not.

Q. Is it a fact that most of them are? A. It is not, to my knowledge.

Q. Do you know of any electric light station that has in connection with it an available water power development that does not use water power for the running of the station? A. No, I do not.

Q. What is the life, Mr. Main, in your opinion, of the water wheels and the water plant of this particular station in question, if proper care is taken of the same? A. The water wheels themselves, the running part, should last twenty-five to thirty years. The wheel cases should last fifty years; and the masonry connected with the plant, I presume, would last one hundred years.

Q. Well, is it a fact that the water wheels, if proper care is taken of them, would last considerably longer than twenty-five years, in your opinion? A. Some do and some do not.

Q. Well, assuming that proper care is taken for repairs and renewals of parts, is there any reason why a water wheel should not last fifty years at this station? A. They might last fifty, but their usefulness might have been gone before that.

Q. You remember of testifying in the Lyman Mills case? A. I do.

Q. Did you testify there that the Boyden wheels and the Hercules wheels were doing efficient service, although they had been in the mill for fifty years? A. I don't think that I did.

Q. Had the Boydens been in there fifty years? A. Practically that.

Q. Didn't you testify that they were performing efficient service? A. I think not.

Q. And they are running the Lyman Mills to-day, are they not? A. They are, so far as I know.

Q. Well, the life of the entire mechanism depends, of course, upon the care that is taken of them, does it not? A. Largely.

Q. And there cannot be any hard-and-fast rule of depreciation percentage, can there? A. I don't think there is any hard-and-fast rule. You have got to consider not only the wear and tear, but the advancement in the art; and those two things must be taken into account together, and a man must form an opinion upon those two things. It is a matter of opinion, depending upon the knowledge and experience of the man, as to what percentage of depreciation you place upon various parts of the plant.

Q. Well, the depreciation depends, doesn't it, upon each individual case? A. To some extent I suppose it does.

Q. How much depreciation in any of your valuations do you allow for the advancement in the art? A. I have not separated those two factors of depreciation.

Q. Can you separate them? A. I cannot.

Q. How much depreciation would you say there was in any of the elements that go to make up the water power plant at this station? I will change my question, because I see perhaps I may take a little time. You made no examination, did you, of the condition of the water wheels at this plant? A. Not the running —

Q. Or the tunnels? A. Not the portion of the wheel that is enclosed in the case.

Q. No. Can you tell me any depreciation that you saw in the water power plant of this plant? A. I don't think there was very much apparent depreciation.

Q. Well, you saw none, did you? A. Yes, I think I did.

Q. What? A. I could see that the wheel cases were more or less corroded —

Q. Well, that was readily —

Mr. GREEN. If you will allow him to finish, Mr. Brooks.

The CHAIRMAN. He has not finished.

Mr. BROOKS. Well, I didn't know but I might ask him a question, and then let him finish.

The CHAIRMAN. All right.

Mr. BROOKS. Because I can keep it in mind, and then I

can proceed with the rest of it. If your Honor does not think so —

Q. That could be readily remedied, couldn't it? A. No. It is a gradual depreciation, wearing away, eating away.

Q. How much did you allow for the corrosion that you saw?

A. I didn't pay any particular attention to that one factor.

Q. Now what other items of depreciation did you notice in this water power plant of the Holyoke Water Power Company?

A. I noticed that the work in the canal at the head gates was somewhat worn.

Q. Well, not materially, was it? A. Why, it was not going to pieces, no.

Q. Well, it wasn't materially worn, was it? A. Somewhat.

Q. Well, how much did you allow for that? A. I didn't pay any particular attention to that one fact.

Q. You didn't consider it worthy of an allowance, did you? A. I did.

Q. And you allowed nothing for it? A. Yes, I allowed something for all of these items taken together, not for each one in particular.

Q. I am not asking for all of them. How much did you allow for that? A. I didn't pay any attention to that one in particular.

Q. Very well. Now what other item of depreciation did you observe in this water power plant of the Holyoke Water Power Company? A. I can't say that I noticed anything else.

Q. Now how much did you allow for those two items of depreciation in that plant, — corrosion and some wearing at the head gates? A. As I said, I did not consider those particular things.

Q. I see. You made no allowance at all for those? A. I did.

Q. I beg your pardon. A. I did.

Q. Well, how much per cent. for each? A. I did not consider those two parts by themselves.

Q. Then you did not allow for either of those, certainly, specifically. A. I did not by themselves.

Q. How much did you allow for the two together? A. I allowed —

Q. For those two, if you will keep to that. A. I did not allow for those two separated from everything else.

Q. Those are the only two items of depreciation that you noticed? A. That is all I noticed.

Q. What was your entire per cent. of allowance for depreciation in the water power plant of the Holyoke Water Power Co.—13? A. About 13 per cent.

Q. Now how many of the buildings did you place a valuation on that are parts of this plant? A. The wheel house.

Q. Was that the only one? Well, I did not mean to confine myself to the water power plant entirely: I meant the entire electric lighting plant. A. I placed the valuation also upon the engine house and boiler house, and figured out the first cost of the dynamo building, but placed no value upon that building.

Q. Just let me look at a schedule of yours a moment. (Examining schedule.) What items of depreciation did you allow for that you saw in any of the buildings that were parts of this plant? A. I saw that —

Q. That is all right. Are you going to give me the items? A. I can't give you each one by itself. I did not separate the items of depreciation for any one particular thing from the whole amount of depreciation.

Q. Well, then, as I understand you, you allowed nothing specifically for any item of depreciation? A. I did not.

Q. Now what items of depreciation did you notice in the wheelhouse? A. I don't know that I noticed anything in particular.

Q. Yet you depreciated the wheelhouse how many per cent.? 8 per cent., did you not? A. 8 per cent., yes.

Q. What items of depreciation did you notice in the engine house of this plant? A. I didn't notice any large item of depreciation.

Q. Did you notice any item of depreciation that you now recall? A. Nothing in particular.

Q. Yet you allowed 14 per cent. for the depreciation of that building? A. I have.

Q. What items of depreciation did you notice in the boiler house of this plant? A. I noticed in the boiler house some fractures in the brickwork, and that the floor was badly worn. I think of nothing else in particular.

Q. Well, were the cracks in the brickwork, in your opinion, a serious item of depreciation? A. Well, it showed that the building had settled somewhat: it was not as good as new.

Q. Do you know when the building settled? A. I do not.

Q. Did you make any inquiries to ascertain? A. I did not.

Q. How much did you allow for the cracks? A. I did not separate.

Q. Well, how much did you allow for the worn floor? A. I did not separate that.

Q. Do you think that 14 per cent. was a fair allowance for those two items? A. I do.

Q. Well, you can't tell me, you have no way that you can tell me the elements in per cent. of your depreciation? A. I cannot separate the two into various elements.

Q. Now about the chimney. Did you notice any items of depreciation in the chimney? A. Nothing in particular.

Q. But you depreciated that 14 per cent.? A. I did.

Q. The dynamo building you noticed no items of depreciation in, made no allowance? A. Noticed a good many cracks in the brickwork of the dynamo building.

Q. You did not depreciate that? A. No, sir.

Mr. GREEN. Just let him finish his answer, Mr. Brooks. You interrupted him right in the midst of his answer.

Q. Did I interrupt you? A. I was going to say, also, I noticed that the basement floor was pretty well worn.

Q. But you made no allowance for that depreciation? A. I did not place any value on the dynamo building.

Q. How did you arrive at the cost of the building?

The CHAIRMAN. The dynamo building?

Mr. BROOKS. I mean the dynamo building.

A. I took the plans which had been put in evidence by the Water Power Company, and figured out the quantities, and then estimated the cost in the usual manner.

Q. Well, I don't know what the usual manner is. Did you estimate it at so much a square foot of floor space? A. No. I estimated all the quantities by themselves, and put against each amount the price per cubic yard or thousand of brick or feet board measure or whatever the quantity was.

Q. For instance, your excavations and your back fills, did you take into consideration the original situation, the surface of the earth at the time these buildings were constructed? A. I did.

Q. Where did you obtain that? From what plan did you obtain it? A. I did as near as I could from the plans which were submitted, and knowing the levels approximately at the two canals.

Q. Is there anything in the plan that shows what the character of the surface of the earth was at the time those buildings were constructed? and, if so, point it out. A. I don't know that there is anything that shows that absolutely.

Q. So, then, you did not take into consideration the original character of the earth's surface at the time of the construction of these mills? A. I did, as well as I could.

Q. I don't dispute that; but there is nothing in the plans to show that? A. I think there is nothing that shows that absolutely.

Q. Do you know for how many days those engines and boilers have been used since they were installed? A. I do not.

Q. From your knowledge of the testimony do you find that they have been in use only about forty days since they were installed? A. That is what I understand,

Q. Yet you depreciated those engines 14 per cent.? A. I did.

Q. And the boilers 35 per cent.? A. I did.

Q. Was any part of that depreciation due to the so-called advancement in the art? A. Some part of it, yes.

Q. How much? A. I cannot separate them.

Q. About how much? A. I don't know.

Q. Is there any electric light plant in New England that you have in mind that uses water power that does not have to

use an auxiliary steam plant? A. I saw one the other day that had no steam plant.

Q. Well, was that the only one that you now recall? A. That is all I recall at the moment.

Q. Where was that? A. That was in Waterville, Me.

Q. That was very small, wasn't it? Had a small output, didn't it? A. Pretty fair-sized station.

Q. Do you know what the output of the Waterville, Me., station is? A. I do not.

Q. And, generally, throughout New England it is a fact, isn't it, that the manufacturing corporations that are really engaged in manufacturing have, in connection with their water power, auxiliary steam plants? A. That is true.

Q. If I have not asked it, I will now. I think I did ask it. Do you know of any mill in the city of Holyoke engaged in manufacturing that does not have an auxiliary steam plant besides the water wheel? A. I do not know of any.

Q. In obtaining the quantity of excavation at this plant, Mr. Main, what slope angle did you take? A. At the head gate and penstock, 45 degrees.

Q. Is that one inch to one? A. One and one.

Q. That would be an inch to an inch and a foot to a foot.

The CHAIRMAN. Has he answered the question?

The WITNESS. I answered it.

Mr. BROOKS. Yes, he did answer it.

The WITNESS. Also on the tail races I assumed the same slope.

Q. The chimney and the other excavations that you have considered? A. I think I considered all the others, in the same way.

Q. What did you take the chimney piles at? A. How much apiece?

Q. Yes, sir.

The CHAIRMAN. Can't you readily tell?

Mr. BROOKS. What?

The CHAIRMAN. Haven't you it on some memorandum? Oh, he has not stated.

Mr. BROOKS. He never has.

The WITNESS. \$4 apiece.

By Mr. GREEN.

Q. Doesn't the schedule, Mr. Main, include all these items?

A. Yes.

Mr. BROOKS. I didn't find that among my memoranda.

The WITNESS. Schedule 2.

Mr. BROOKS. I haven't got it.

The CHAIRMAN. Here, Mr. Brooks.

Mr. BROOKS. May I take it? (Taking paper.)

By Mr. BROOKS.

Q. Did you endeavor to ascertain what those piles cost the Holyoke Water Power Company? A. I did not.

Q. If they cost \$10 apiece, it would make quite a large difference, wouldn't it, in the cost of this chimney, in your opinion? A. It would make a difference of \$726.

Q. I am only going to run over a few of these things with you. What did you allow for pumping? A. On the chimney?

Q. Yes. Anywhere on the various buildings. A. Didn't allow anything on the chimney.

Q. Did you endeavor to ascertain whether they had it to do or not? A. No, I did not.

Q. Do you know the length of the piles that were used for this chimney? A. I think not.

Q. Well, what did you allow for pumping anywhere, in your calculations? A. I allowed in Schedule 2 for the rack, head gates, and penstock, \$500. For coffer dam and pumping —

Q. How much did you allow for each? A. I did not separate them.

Q. Did you endeavor to ascertain how much the coffer dam cost? A. I made an estimate of it.

Q. What was the estimate of your coffer dam? A. I will have to look and see. (Examines paper.) \$355.

Q. \$355 for the coffer dam? A. Yes.

Q. That is for the wheel pit and tail race? A. No, sir, that is for the rack, head gates, and penstock.

Q. Very well, that would leave \$125 for your pumping? A. \$145.

Q. \$145 for the pumping. Did you know how far down they went? A. Only as shown by the plans.

Q. Yes. Now for your coffer dam and pumping in the wheel pit and tail race, I see, you make the same allowance, \$500. A. \$500.

Q. Is the division made the same way? A. Yes.

Q. \$145 of that \$500 is for the pumping? A. Yes.

Q. Do you know whether or not the wheel pit and tail race went below the level of the canal? A. They went to the same level as the bottom of the canal. Which canal do you refer to?

Q. Second level. A. The bottom of the wheel pit and tail race was about on the level of the bottom of the second canal.

Q. Where did you obtain that estimate, from the plans? A. Yes.

Q. Did you estimate how many days of pumping there would be? A. No.

Q. Can you tell me how many days there would be? A. No.

Q. Nor the cost of it? A. I allowed \$145.

Q. Yes, I know you did. And how much water they were obliged to pump you made no estimate of? A. No.

Q. Mr. Main, have you ever constructed or been the engineer of an electric light plant for public lighting? A. I have.

Q. Where? A. We were engineers for the Lynn Gas & Electric Company, for their buildings and power plant, of the electric light plant. We had nothing to do with the electrical end.

Q. Did you have anything more to do with it than to advise with reference to the steam plant? A. Yes, sir. We made all the plans for the buildings and the arrangement of the machinery.

Q. Were they built in accordance with your plans? A. They were, so far as I know, except, I think, some of the piping.

Q. Is there any other plant but that? A. Yes.

Q. What other electric lighting plant for public lighting have you been the engineer or constructor of? A. We were engineers for making the plans and constructing the electric light plant for the town of Marblehead.

Q. Yes. Are there any more? A. Those are the only two public lighting plants.

Q. Were you engineer of each of those? A. Yes.

Q. You say "we." I didn't know whether you it meant?
A. Our firm, and I was the one who looked after the work.

Q. Who determined at Lynn the size of the electrical units, you or Mr. Prichard? A. Mr. Prichard. As I said before, we had nothing to do with the electrical part.

Q. I didn't hear you say that. Did you say that you placed the machinery in either of these plants? A. We did, in both.

Q. Electrical machinery? A. Yes, placed, arranged them on the plan. The determination of the units was made by Mr. Prichard.

Q. Then the determination of the arrangement was made by Mr. Prichard? A. I think not.

Q. Well, do you say not? A. We worked together on the thing.

Q. Wasn't Mr. Prichard the determining factor in the arrangement of the electrical machinery? A. He was the final judge of the arrangement.

Q. That is, you gave Mr. Prichard such advice as he asked for in connection with the steam plant? A. No, sir. I don't take it that way at all. He said what he wanted to do, he said how much of a plant he wanted, and in a general way he said what he wanted: then we went to work and made the plans complete and worked together, Mr. Prichard and our firm, and we laid out the whole arrangement, buildings, machinery, power plant—

Q. That is, your concern acted as Mr. Prichard's draughtsman? A. No, sir, not at all. We acted as Mr. Prichard's engineers.

Q. Who was it that determined the arrangement of the machinery and the size of the electrical units? A. Mr.

Prichard determined the size of the electrical units: together we determined the arrangement of the machinery and everything else that was connected with the plant.

Q. Well, the arrangement of the machinery went about as Mr. Prichard said, didn't it? A. Everything went as he said, practically.

Q. Now, if he determined the size of the electrical units, he determined also the size of the steam units, didn't he? A. I don't think he did.

Q. Well, doesn't the one follow the other? A. It necessarily does.

Q. Well, then, if he determined the size of the electrical units, it was he who determined the size of the steam units, wasn't it? A. It was not. It does not follow as you state, because it is a belting station.

Q. Didn't it follow in this instance? A. It did follow.

Q. Well, you don't think belted units, as I understand, are as efficient as direct-connected? A. I think not.

Q. But you used belted units at this station in Lynn? A. That was built several years ago.

Q. How many years ago? A. Eight, I think.

Q. What units were used at Marblehead? A. Those were small units.

Q. Were they belted? A. It was a belted station.

Q. When did you build the station at Marblehead? A. Seven years ago.

Q. Seven years ago. Now you say, as I understand you, that you think the direct-connected units are 10 per cent. more efficient than the belted? A. I think so.

Q. In what electric station did you make any test to determine that? A. I made no tests.

Mr. BROOKS. That is all I care to ask.

Re-direct examination by Mr. GREEN.

Q. I noticed at one point in your cross examination that you spoke of the fact that you had capitalized at 5 per cent. in every instance except one or two. I should like to ask you why

you used 10 per cent. in one or more instances and 5 in the others?

Mr. BROOKS. Will you be kind enough to point out to us the instances?

The CHAIRMAN. I think he stated, Mr. Green.

Mr. MATTHEWS. He did not state the reasons.

Mr. GREEN. He stated the fact. He did not state the reason.

The CHAIRMAN. Go on.

A. I used 10 per cent. in only one instance, and that was in determining the cash value of the rentals; and the reason why I used it there was because I think that a man would not invest his money in property of this sort that did not offer a return of 10 per cent. It looks into the distant future, and many changes will probably occur, some toward the reduction of cost, and power may be made in other ways than by water power; and, in order to discount these future advances in the art, I should say that 10 per cent. is none too large a percentage by which to capitalize.

Mr. BROOKS. Will you refer us to the page where that is?

Mr. GREEN. In Thursday's testimony he speaks of it in two places.

Mr. BROOKS. He said that in the direct examination, but I mean about this 10 per cent.

Mr. GREEN. In the direct examination?

Mr. BROOKS. Yes, he told about his capitalization in his direct examination.

Mr. GREEN. I do not remember where it comes in.

By Mr. BROOKS.

Q. Where is the schedule this applies to, Mr. Main, — your 10 per cent. capitalization? A. There was no schedule for that: that was on a small slip of paper. I do not know whether it was put in as a schedule or not.

The CHAIRMAN. He gave a valuation of \$100,000. He said \$50,000 for something that related to the plant, and then the income was \$4,900, — 10 per cent. on that.

Mr. BROOKS. I remember, now that your Honor refreshes me.

By Mr. GREEN.

Q. You were asked in cross examination, if you were compelled to pay the Holyoke Water Power Company, assuming that you ran by steam, for condensing and feed water, whether that would enlarge your steam expenses very considerably, to which you replied, and there were a number of questions along there with regard to condensing water. It led me to think of one thing that I intended to inquire of you in the direct examination and forgot. Have you considered the question of a cooling tower or not? A. I have not.

(Mr. Green asked for the production of the plan on which the witness had previously marked a place which he had considered available for the proposed plant.)

Q. I notice an answer to one of the questions asked you on cross examination, to which I wish to call your attention.

"Q. Well, I understand you didn't get onto the track; you were on some other land? A. I didn't cross the track. I saw the land from the other side of the river."

A. The railroad that should be.

Q. You were asked this question in cross examination:—

"Q. You say in none of your tables have you included in the cost of water power the yearly cost of water power or of steam power, either liability insurance or legal expenses?"

And you said,—

"A. I included them in the total running expenses of the station in one schedule."

In any case where you have been considering the operating expense of a water plant or the operating expense of a steam plant, either one or the other, have you included those items? A. I have not.

Q. That was the running expense of the entire plant? A. It was.

Q. You say that, when you have been studying simply the operating expense of the steam plant apart from the rest, or of the water plant apart from the rest, you have not included them? A. I have not.

Q. On either one side or the other? A. No.

(The plan which had been called for was produced.)

Mr. BROOKS. I would like to have this mark that was made the other day made a little more permanent in some way upon this plan, so that we may be able to refer to it in the future.

The CHAIRMAN. Mr. Main, you will undertake to make it more permanent, will you? Let us have it inked.

Mr. GREEN. If your Honor please, I suppose I may ask a question. I have a right to.

Mr. BROOKS. No doubt about that; but I have a right to have this identified if I choose to, beforehand.

Q. Now, Mr. Main, I want to be sure about that plan. Have you measured it? When you picked out that place, when you marked that spot, whether or not you measured it then?

A. I scaled it on some map or plan. I don't remember what map or plan I used now. I think it was the City Atlas.

Q. A scale of how many feet? A. I don't remember. Do you want the distance that I got?

Q. Yes, what is the distance that you got?

Mr. BROOKS. He testified to that on cross examination.

Mr. GREEN. I simply want to get at the figure. It was marked here.

The WITNESS. About 6,000 feet in a straight line.

Q. 6,000 feet in a straight line from what? A. From the dam.

Q. Will you scale that, and see if it comes to that distance?

By the CHAIRMAN.

Q. Did you say 6,000 feet? A. About 6,000 feet it scaled on the map. The mark which I placed on the plan scales from the dam in a straight line about 5,400 feet.

By Mr. GREEN.

Q. You were asked if the load in a cotton or woollen mill was less steady than in a paper mill. Supposing that the load in a cotton or woollen mill was less steady than in a paper mill, whether the water power would be more or less valuable?

Mr. BROOKS. How is that of any consequence?

The WITNESS. Less valuable. It would be less valuable.

By Mr. BROOKS.

Q. Which? A. The load which is not so steady.

By Mr. GREEN.

Q. Less valuable for the paper mill? A. For the cotton or woollen mill.

By the CHAIRMAN.

Q. What do you mean by that? I didn't quite catch on. A. I placed the valuation upon these 16 mill powers—

The CHAIRMAN. Don't go into that. I will withdraw my question. I think I understand.

Mr. GREEN. The steadier the load, the more valuable the power. That is about what it amounts to.

The CHAIRMAN. I should suppose that is so.

By Mr. GREEN.

Q. You were asked about the back water in Lawrence. Can you tell how often the maximum back water given there occurs? A. Once in a very great number of years.

Q. I was trying to find a place in the testimony here where you desired to explain something. Do you remember the place? I think it involved Mr. Anderson's computations. I have found the place. Let me read the evidence to you.

"Q. I see that you have an item of expense, \$760, fixed charges for the Springfield plant. A. Yes.

"Q. From what source did you obtain that figure? A. That also came from Mr. Anderson.

"Q. Did that come in his statement of the total expense for power of \$2,617? A. It came in his total expense of power of \$2,048.70, which he afterward corrected and made \$2,617.

"Q. And you took the first estimate rather than the last estimate? A. No, I beg your pardon. When I made the comparison, I took the largest one that he made.

"Q. Did you say that \$760 interest, fixed charge, was taken from the estimate amounting to \$2,617 that he gave? A. No, it was not.

"Q. Then that was taken from the—\$2,048? A. Yes, I think there is a misunderstanding between us now.

"Q. Well, I do not know that there is. Just state. If there is no objection, let Mr. Main state. A. These items, —I will explain why they were put down here and what I used when I get through."

Then we passed on. Now will you explain what you did mean by your answer? A. The items which were put down and included in the \$2,048.70 as given by Mr. Anderson were simply tabulated for the purpose of putting in form very similar charges in the Holyoke plant. When I made my final comparison between the Holyoke and the Springfield plant, I did not take this \$2,048.70, but took Mr. Anderson's largest figure, \$2,617. The former figures were only put in the table for the purpose of putting an offset to the figures which were equivalent for the Holyoke plant, but they were not used in the final estimate.

Q. On the first day of your direct examination in Boston you testified as follows:—

"Q. Then will you state what, in your opinion, that building would cost new?"

This was referring to the electric light building.

"Will you state what, in your opinion, that building would cost new,—as of what time? A. Jan. 1, 1898.

"Q. As of Jan. 1, 1898. A. \$23,700.

"Q. What does that represent? Whether that is the contractor's price? A. That would be the contractor's price. It includes all the contractor's profits.

"Q. In that is there anything included for engineering? A. It included all the incidental expenses for engineering and interest on the cost during the construction. It is intended to be an outside figure to cover all of the cost."

Then you were asked:—

"Q. Can you tell us what your estimate was of the cost, leaving out the engineering and incidentals, but simply including contractor's profits? A. \$20,927.72."

Mr. GREEN. It does not appear that I have offered that schedule, since the reforming of the schedule. Inasmuch as it

was used by Mr. Warner, as part of his table, I should like to have it in.

The CHAIRMAN. Is there any objection?

Mr. BROOKS. I should like to see it before it goes in.

The CHAIRMAN. What page is it in that book?

Mr. GREEN. It is not in this at all. It was prepared as a separate schedule, on account of the fact that the witness did not testify in regard to the valuation of the electric plant. It was prepared for Mr. Warner's benefit.

The CHAIRMAN. This valuation of the dynamo building?

Mr. GREEN. Yes.

The CHAIRMAN. Mr. Warner put it in. His testimony depends on that, does it?

Mr. GREEN. His testimony depends on it. I thought it was given.

The WITNESS. I have it here. Shall I take this out?

Mr. GREEN. Yes, take it out, please. It was prepared as a separate matter: it was prepared purely for the accommodation of Mr. Warner.

I should like to offer this schedule, entitled "Estimated Cost of Dynamo Building," in connection with the witness's testimony of what it cost.

The CHAIRMAN. The items of the details of the building, I suppose?

Mr. GREEN. That is all.

The WITNESS. Yes, sir, it is.

Mr. GREEN. I would like to have that printed, if it can be, immediately after his testimony in regard to it.

Mr. BROOKS. I have no objection.

(Schedule marked "Exhibit 158½, F. H. B.")*

Q. When you were asked in regard to the water power in Holyoke, and the word "constant" was used in connection with the water power, did you refer to constant in head or constant in quantity? A. Constant in head is what we were talking about.

Mr. GREEN. That is all.

* The schedule above mentioned is to be printed in a later volume.

Re-cross examination by Mr. BROOKS.

Q. You say, as I remember your testimony, that the lot of land that you had in mind for the erection of your ideal plant, which you used in obtaining the value of the present plant, was up the river and was at the foot of Cornell Street, if Cornell Street were extended. A. About there.

Q. And your mark upon this plan is about at the foot of Cornell Street? A. Yes, sir.

Q. How much of the year do the users of water power at Lawrence get their full head? and that, you said, was 28 feet, I think. A. That varies. Practically, I should say they had it for about ten out of the twelve months.

Q. Perhaps my question is not a proper one; but does that include low water and high water? A. No, I thought you were speaking about back water.

Q. No. A. Or head.

Mr. BROOKS. (To the stenographer.) Just repeat the question.

(Question read.)

A. That is what I understood the question to be. Practically, about ten months out of the twelve.

Q. What is the average back water at Lawrence for the five past years? A. I cannot give it.

Q. When were you there? A. I go there pretty nearly every week.

Q. No; but I mean when you were there with an experience as to water power? A. I was there from January, 1881, to January, 1892.

Q. What was the average back water at Lawrence for the years that you were there? A. I cannot answer that question.

Q. Can you approximate it? A. Well, I could give my recollection.

Q. I would like it in feet. A. I should say the average spread over the whole year would not be over a foot.

Q. What I am after is, while it lasts. A. You asked for the year.

Q. Well, while it lasts during the year. A. It would be about five to six feet.

Q. What would the head be during that time? A. It would be 22 to 23 feet.

Q. I think you stated that some of the estimates in your valuation of the buildings were really the estimates of Mr. Mace Moulton? A. No, sir; I never heard of him in this case.

Q. Well, on the iron work where did you get your figures? A. I made them up from the plans myself.

Mr. BROOKS. Oh, I see; all right.

LOUIS BELL, *sworn.*

Direct examination by Mr. GREEN.

Q. Your name, doctor? A. Louis Bell.
Q. Where do you live? A. Brookline, Mass.
Q. And your business? A. Consulting engineer.
Q. In what line? A. Principally electric.
Q. Will you state where you were educated, and what degrees you have taken? A. I was educated at Dartmouth College, from which I graduated in 1884; and thereafter at Johns Hopkins University, Baltimore, where I received the degree of doctor of philosophy in 1888.

Q. With what other institutions have you been connected? A. I have been connected as instructor or lecturer on electrical subjects with Purdue University, Lafayette, Indiana. It is the Indiana State technical school. I was the professor of electrical engineering there in 1888 and 1889, and for the last five years I have been the lecturer on electrical power transmission at the Massachusetts Institute of Technology.

Q. Following the years 1888 and 1889, were you engaged in the electrical business in any capacity? A. I went to Chicago in 1889, and was there engaged in business as consulting electrical engineer, the firm name being Bliss & Bell, my partner being Mr. George H. Bliss, one of the early presidents of the Chicago Edison Company.

Q. Have you written on the question of power and transmission of power and electrical subjects? A. I have had occasion to write considerably on those topics. I have published three books dealing with them: one in 1891 or thereabouts on the electric railway, in connection with Mr. O. T. Crosby; and another in 1896 on electric power transmission, and at about the same time one on power distribution for electric railroads.

Q. I believe, to put the question directly, you were the editor of the "Electrical World"? A. I was editor of the "Electrical World" in the years 1890 and 1891 in New York.

Q. Is your work on the subject of electric power transmission used as a text book in one or more colleges or institutions

of learning? A. I think it is. It was not specifically intended as a text book, but I believe it is used in half a dozen institutions scattered here and there, where they have courses in power transmission, which is rather unusual.

Q. Have you been connected as consulting or designing engineer with electric plants operated by steam or water power or both? A. Yes, to a very considerable extent.

Q. Can you mention some of the plants? A. I was chief engineer of the power transmission department of the General Electric Company for about three years from 1892 on, and in that capacity I practically planned all the power transmission plants that were contracted for or proposed for by that Company. I prepared the plans either directly myself or through some of my assistants, and I prepared during that period practically all the estimates on electric power transmission apparatus that went out from the Company.

Q. With about how many companies were you connected through the General Electric Company? A. Oh, I really could not say. I suppose I made more or less complete estimates or engineering plans for thirty or forty various propositions. Of course some of them went to competitors and others of them went in. But except in occasional instances when I was away, or something of that kind, all the plans for the power transmission work of the Company went through from my O. K.

Q. What form of power was used in these plans? A. Frequently water power and occasionally steam power; sometimes both.

Q. Have you been called upon to determine the value of water power for electrical purposes? A. Yes, rather frequently; both in connection with the proposed installation of plants for hydraulic working—that is, with hydraulic motive power—and in some instances in cases of plants which were operating, and which were considering making contracts with other companies involving hydraulic power.

Q. And in determining the value of water power for electrical purposes, doctor, what have you done? How far have you gone in the construction, if at all, of hydraulic plants? A. What is the question?

Q. Have you constructed hydraulic plants yourself? A. I have superintended the construction of quite a few hydraulic plants for the General Electric Company and elsewhere, and the most of the work that I had to do with the General Electric plants was in connection with the use of water. Sometimes the operating company had general charge of the arrangement of the water plant, and sometimes the water power plant was handled by other people; but I had occasion to handle a good many of them in that way.

Q. Will you tell us the name of some of the plants in connection with which you have been called upon to determine the value of water power for electrical purposes? If it will refresh your memory, you may look at this sheet, which you handed me at one time, if there is no objection. (To Mr. Goulding.) You may see it if you like.

Mr. GOULDING. I have no objection whatever. I suppose it is honest.

Mr. GREEN. It will shorten it up a little. (Giving paper to witness.)

A. I find the following water power plants with which I have had to do as consulting or constructing engineer, and in most of these the question of the cost of production by water power was the one which had to be settled and was settled in the beginning, when the plant was installed, each case being settled on its merits according to the circumstances: plant at Redlands, Cal., at Sacramento, Cal., at Concord, N.H., at Taftville, Conn., at Columbia, S.C., at Traverse City, Mich., at Dowagiac, Mich., at St. Hyacinthe, P.Q., at Big Cottonwood Canyon, Utah, at Portland, Me., at Pachuca and at Guadalajara, Mexico. There are a considerable number of these which were plants which were planned, or for which tenders were made through me, when I was with the General Electric Company; and in some instances I have been called in independently, since I left the General Electric Company five years ago, as consulting engineer on this question. The Columbia plant has called me in since.

The CHAIRMAN. A little louder.

The WITNESS. I have been called in by the Columbia

(S.C.) plant since then to determine the question of the value of their power, and also by several other companies which I do not find down on this list.

Q. Of what societies are you a member? A. I am a member of the American Institute of Electrical Engineers; that is the principal society of which I am a member.

Q. Whether or not in connection with this business you are familiar with the cost of water power, not only as applied to electrical plants but otherwise? A. I have had to go over the question in connection with projects for transmission plants very many times, so that I consider myself fairly familiar with the general conditions regarding the matters of hydraulic installation, in respect to cost and so on. Nearly all power transmission work is transmission from water power, and in connection with nearly every project which comes up one has to deal with the value of water power to a certain extent; sometimes greatly *in extenso*, sometimes comparatively little.

Q. You have not stated, I think, anything in regard to your experience with steam. Will you tell us about that? A. In a certain proportion of the cases of power transmission one has to deal with steam plants, and I have been called in now and then to deal with plants in which steam was used exclusively as a motor power. But most of my experience on steam plants has been in connection with auxiliary plants for use in connection with transmission work. I have had occasion as consulting engineer and designing engineer to deal with quite a number of those, but with independent steam plants only in a few instances.

Q. Have you installed steam plants? -A. Yes, in connection with that work; but I have never made a specialty of putting in big steam plants: my work has run more to their use as auxiliary.

Q. Have you made tests in connection with the use of steam plants? A. Oh, yes.

Q. To determine what? A. To determine the power, efficiency, and so on.

Q. Have you to determine coal consumption? A. Oh, yes, it is a part of the regular efficiency test.

Q. Whether or not, doctor, at the request of the City you have looked over the electric light station of the Holyoke Water Power Company? A. I made an examination of it at the request of counsel for the City last fall.

Q. Do you remember when? A. I should say early in December. I have forgotten exactly. December, I think, but possibly late in November.

Q. November or December, that is, last past? A. Yes; this last year. I was there a couple of days, looking over the general situation, and I made several visits to the plant. I was there each day, I think.

Q. Did you examine the water plant as well as the electric plant? A. Casually.

Q. Or the steam plant? A. Casually; that is to say, as far as one could examine a water plant, most of which is out of sight.

Q. I mean so far as you could? A. Also the steam plant.

Q. Did you examine the distribution system? A. Yes; to the extent of driving over the lines, and looking over the general arrangement and character of the system and the structures.

Q. Will you tell us, please, what you noticed in regard to the plant, taking either one first that you desire? A. With respect to the general character of the plant, it is typical of the plants which were put in about the years 1888 or 1889 to 1891. Many plants put in at that time consisted of large mill-like buildings, with arrangements for many small dynamos, and a very elaborate arrangement of shafting to handle this large number of units. The result was a rather imposing-looking affair, containing a comparatively small amount of machinery, as regards output. I remember in particular in St. Louis a plant which is arranged something after that style, a plant of about the same time. I mention that as an instance. The machinery in the Holyoke plant, the electrical machinery, strikes me as having been, on the whole, very well cared for, but the machines themselves are entirely out of date. I think that with one exception the machines which are now used in that building are no longer made so that spare parts, and so

forth, cannot be had for them. They are old type machines, and the manufacture of them has been abandoned. They are, however, fairly kept up. The steam plant is fairly typical of the sort of plant often used ten years ago for running electric light stations, consisting of big Corliss type engines,—good engines of their kind and in their day,—running an elaborate system of shafting from which the small dynamos were driven. The steam plant, as far as the engines were concerned, seems to be in very fair condition. I should judge it hadn't been seriously neglected, but as in the case of the dynamos the engines are not such as would be put in to-day, or put in three or four years ago. They are big, simple, non-condensing engines, taking up a very large amount of room, and requiring a very large engine house for their operation. The boiler plant consists of vertical fire tube boilers, Manning boilers, so called. The boilers seemed to be in fair condition, as far as I could tell by a very casual inspection. They are a tolerably efficient boiler, a little subject to priming, but boilers which are in fair condition, and I should say still capable of doing good service. The number of them is rather unnecessarily large, the boilers themselves being rather small, and the whole boiler plant is laid out in what would have been considered, almost at the time when it was built, an extremely bad way. That is to say, it is too complicated. They use a large number of small boilers, all nicely connected into one fine large stack, but on account of their considerable number, being badly scattered, requiring a good deal more work in caring for them than with modern boilers. But they seemed to be in fair condition for what they are, not unserviceable boilers. The general criticism I should have to offer on the situation, on the whole steam and electric plant, is that the whole was built in accordance with the lights of 1890, or thereabouts. It is very much too large for the accommodation of a plant of similar size and similar capacity, as it would be installed to-day. It is a big, lumbering, unwieldy, old-fashioned plant, in very respectable condition, except that the floors are oil-soaked, and more or less subject to fire. The hydraulic plant is rather unfortunate in this respect.

Mr. GOULDING. I want to interfere, with an objection.

This is the first time I ever heard a general attack, by terms such as have been thrown out here, on a subject, instead of an accurate description and demonstration of a scientific man. A mere rhetorical flourish of attack on this property I think can be taken care of by counsel very well in the close. I submit that the business of an expert is to give a scientific and accurate description, and to eschew rhetoric as far as possible.

The WITNESS. I beg your pardon, Mr. Goulding. I will endeavor so to do.

Mr. GREEN. I take the blame on myself for anything that the witness may have said. I told him to proceed and describe it.

The WITNESS. I think my language was ill-chosen in regard to that. In respect to the hydraulic plant, like the rest of it, it is an old-fashioned plant, fairly well kept up. I refer particularly to the fact that the hydraulic plant is installed with vertical shaft wheels.

Q. Now, will you explain what advantage or disadvantage you find in those wheels? A. The disadvantage of the wheels is that it requires the use of a vertical main shaft, that being the water wheel shaft, and the power has usually to be utilized upon a horizontal shaft. The result of using a vertical wheel is that you have to have the bottom of the wheel case some species of water step or bearing, to take the weight of the shaft, and you have to use large and occasionally troublesome gear wheels in order to transmit the power to the horizontal shaft.

Q. How could that be avoided? A. That would be avoided by using a horizontal turbine with horizontal shaft. And for the past few years, save in rare instances where hydraulic conditions have driven engineers to use vertical shafts, the use of vertical shaft water wheels for electric plants is substantially unknown. That is to say, I know of extremely few, among many electric plants, where this type of wheel is used now. It would scarcely ever be employed now, although there were many of them in use in the early days of electric lighting, where the practice followed was akin to the practice of small mills. The objection is not a very serious one, but somewhat of an

inconvenience in taking care of the plant,— this use of vertical wheels. A more serious annoyance, if I may so call it, in this plant, is the fact that this wheel house is an unnecessarily long distance, as appears from a very casual inspection, from the dynamo house. There is a long tunnel underneath, apparently a roadway, an unoccupied space of ground, through which the shafts from the water wheels pass in the shafting room. It necessitates quite long shafts, with a considerable number of bearings, which consume more or less power,— not a very large amount, to be sure, but every bearing is something to be taken care of, as constructed. Within the last few years, I think, an endeavor has been made to get the dynamos considerably nearer the wheels than in this plant. I judge the wheel plant has been very fairly well taken care of. I saw no signs of its being severely worn, and I think in its day it might have been, so far as mere construction, a very good plant, but it is now out of date.

Q. Apart from preserving a roadway, or open space, between those buildings, can you see any object in having the wheel house separated from the dynamo building? A. I can't imagine what was in the minds —

The CHAIRMAN. You don't need to.

Q. From the inspection of the buildings and study of the plant, apart from the desire to preserve a roadway, can you see any object in a separation of the two parts of the plant? A. I certainly cannot.

Q. Does the tunnel serve any other object than carrying the shafting in from the wheel house? A. No object that has any connection with the plant, as far as I can see.

Q. You spoke of bearings made necessary by the separation of the two plants. What disadvantage is there in having a great many bearings? A. Well, it simply means more care and a little more loss of power. The loss isn't serious, but a long line of shafting is just one more thing to be looked after, and, although it may not need care often, when it does it may need it very badly.

Q. In regard to your vertical wheel, you have to get power onto the horizontal shaft. Whether or not there is any loss of power there? A. There is some loss of power in the gears, undoubtedly.

Q. More or less than if you had horizontal wheels? A. Well, the power on the wheel shaft would be about the same in a horizontal wheel and in a vertical wheel. I know of no reason why there should be any difference; so whatever loss there is in turning the corner by means of gears is a loss of efficiency, but not very large.

Q. But, whatever it is, you would save it? A. I would save it, whatever it is.

Mr. BROOKS. I should like to have the previous answer of the witness read by the stenographer.

(Answer read.)

Mr. BROOKS. I thought he said something more. I thought he added that it would be very small.

The WITNESS. I said the loss would be rather a small loss. I didn't attempt to say what it would be, but it would be a small loss, provided the gears were well taken care of. If the gears were not taken care of, it might be very large.

Q. Doctor, I don't think I understand one thing you say. You say the power on the wheel shaft would be the same, whether horizontal or vertical? A. Substantially the same; yes.

Q. Before it gets onto the wheel shaft, it has to be delivered there by one loss? A. I mean by the wheel shaft the shaft on which the turbine itself is. Of a vertical wheel, it is vertical.

Q. The power there would be the same in getting onto the horizontal shaft, but there wouldn't be the same loss? A. You would have the loss of the gears, which might be quite small if it was a well cared for wheel, and it might rise to serious magnitude and cause trouble if not cared for.

Q. Is there any other disadvantage, in connection with the plant as laid out there, in having the whole arrangement as it is, or in having the buildings separated as they are? A. Well, with the whole arrangement of the plant, with those long wheel shafts, and with the shafts which are used in connection with them in the shafting room, the disadvantage is, that they have to use a very large amount of shafting, which has a large number of bearings, and it has to be kept in order, and it is a

source of more or less trouble and expense. The arrangement of the plant is such as to necessitate what would now be considered a very unnecessary amount of shafting. And part of that large amount is due to the fact that it is a complicated plant, with auxiliary engines, and the engines have to have their driving arrangements onto the same long mass of shafting. The whole arrangement is such as calls for a very unnecessary amount of shafting.

Q. And, to illustrate, how could the losses have been avoided? Just show us wherein they could have been avoided, provided there was no desire to keep the buildings apart? Provided that the buildings were not to be kept apart, and the power house and dynamo plant could be built together, can you tell us how these losses could have been avoided?

Mr. GOULDING. We object.

The CHAIRMAN. Admitted, unless you desire to discuss it. Do you desire to discuss it?

Mr. GOULDING. I should like to be heard on the competency of it. It certainly cannot be competent for him to give in evidence all kinds of possible constructions that can be imagined or thought of by an expert,—how he could have constructed a better kind of a factory, or better kinds of appliances than these, ten years ago, at the time these were constructed. I submit that it couldn't be competent, and it wouldn't be competent, in the advanced condition of art we get now, to show how it could be constructed, to show the variety of things that he can imagine, for the purpose of affecting the value of this property that you have got to value as of two years ago, and which undoubtedly was built eight or ten or more years ago. How does it directly bear upon the question? How does it indirectly bear upon it, so as to be competent evidence? Suppose it was a question of a railroad. Can a man come on and say: Well, now, this is constructed 4 feet 8 1-2-inch gauge, and it is designed to run by locomotives, where the power is applied on the engine, made on the engine and applied on the engine; whereas it would be a very much more modern thing to put on the third rail, and connect with electricity, with power at the power station, and all that sort of thing? Would it be compe-

tent evidence as bearing on the value of a railroad constructed in the way that railroad was constructed?

The CHAIRMAN. This would be another ideal plant, Mr. Goulding.

Mr. GOULDING. Another ideal plant, to be sure; but it is an ideal plant of such a vague and nebulous character that you can't get at it to criticise it. It is more objectionable than the ordinary ideal plant upon which the respondents base their case.

Mr. GREEN. It is offered for something more than the idea of an ideal plant, for this reason. The petitioners chose, in building their plant, to preserve a roadway which they wanted to use. Now they want to have us take that, and pay for it at the rate of \$1,500 a year per mill power. They use that for their own convenience; and for their own convenience in building their plant they preserve that roadway, and to do that they have separated the wheel house from the rest of the plant. We say by so building their plant they have added a great many horse power to the load of their plant. Yet they want us to pay for that horse power. I am asking him now the question whether the method of constructing the plant affects the amount of power necessary to run the plant. I suppose I can ask that.

The CHAIRMAN. Here is the difficulty. You take the effect of a thing never created, something that isn't in existence, and undertake to value it.

Mr. GREEN. I am not asking you to value a thing created in the place of that; but I am simply asking the witness to point out wherein, in good practice, it should have been different.

The CHAIRMAN. Why can't you ask the question I suggested? Doesn't that cover your difficulty?

Mr. GREEN. I don't know that we can't ask that question that I put, in good practice. Why doesn't the other question cover it? And I am not going to discuss it now, but later I may put the question.

Q. Will you tell us, doctor, specifically, what disadvantage there is in this shafting and in this arrangement of the build-

ings, what losses there are, and how much they amount to? A. I supposed I had already told that.

The CHAIRMAN. He has already told it, but let him state it again.

The WITNESS. Well, to avoid controversy I will repeat whatever I may have said, and add something to it.

The CHAIRMAN. The question is specifically put to you.

The WITNESS. The disadvantage of the present arrangement of the plant is, that power which is produced by those water wheels has to travel a considerable distance along shafts, an unnecessarily complicated arrangement, in order to get to the generators, which are themselves considerably scattered, on account of their being small machines, and to a considerable number. The result of this is, there is a certain loss of power, which could be avoided, and would be avoided, in building a plant within the last few years, by putting in different machines, using larger machines in the first place, and putting the machines nearer to the water wheel. I think plants as laid out to-day — as I would have laid them out four or five or six years ago — would be constituted with horizontal water wheels instead of vertical, with as little shafting as necessary, if the conditions required a belted plant, and with as little shafting as possible if the plant should be direct-connected, using modern direct-connected units.

Mr. GOULDING. I ask that the whole of the answer may be stricken out. It is a good specimen of the kind of evidence that is put in. I ask that it may be stricken out.

The CHAIRMAN. I think all but the last sentence is competent.

Mr. GOULDING. I think the whole of it is incompetent, and I would like to have the question saved, whether any of it is competent.

The CHAIRMAN. The last sentence may be stricken out.

Q. Will you tell us, doctor, if you made any calculations to determine the amount of power that is expended to run the shafting of this plant, as at present constituted? A. I was present at some tests which were made to determine that quantity.

Q. Can you tell us how much power it takes, first, from the wheel and from the engine, to run this shafting?

The CHAIRMAN. Let me make a suggestion there, Mr. Green. You put in by Mr. Main a long schedule. Couldn't the doctor simply go on that?

The WITNESS. The results of that test, which was made in company with Mr. Main and some of the experts for the Company, have, I think, been put in evidence. But, as nearly as I can recollect, the loss in power taken for the running of the shafting was, under various conditions, from 50 to over 100 horse power.

By Mr. BROOKS.

Q. Do I understand that you made these tests? A. I assisted at the funeral. I was over there with the experts for the City, and watched and took part in the test to a certain extent.

By Mr. GREEN.

Q. Doctor, when you say it took from 50 to 100 horse power, just what was run with that, did you hear Mr. Main testify? A. Yes.

Q. Was it described by him? A. I think it was described very fully in Mr. Main's testimony.

Q. Then I won't ask you any more. A. Pardon me. I should say that the minimum power taken under the most favorable conditions was less than 50 horse power, quite a little, and the maximum was a little, quite a little, over 100.

Q. Taking the observations you say were made that day, and all the data that you have, how much, in your opinion, is the power that it takes on an average to run the shafting from the wheel? A. Under average conditions I should say that it took something over 50 horse power.

Q. And from the engine? A. From the engine, rather more than that, by the friction of the engine.

Q. Under good engineering practice in January, 1898, how much would that loss have been?

Mr. GOULDING. I object.

The CHAIRMAN. I don't see the competency of that.

Q. What ought that loss to have been, doctor?

Mr. GOULDING. I object. I suppose the question means what it ought to have been if there had been some other kind of construction. If he meant that at that time, with those appliances, what it ought to have been, more or less, I don't object to it.

Mr. GREEN. I mean if this plant was constructed in accordance with good engineering practice, in January, 1898, what would have been the loss, and I think I have a right to ask it?

Mr. BROOKS. I think it has been ruled on months ago.

Mr. GREEN. It has been ruled in twice. I once asked substantially that same question in another form, then I modified it by the phrase "under good engineering practice." It was then allowed to go in. I think it was when Mr. Warner was on the stand. If the plant had been constructed in accordance with good engineering practice in January, 1898, what would this loss have been? I suppose that is admissible.

The CHAIRMAN. Was it objected to by Mr. Warner?

Mr. GREEN. Not by Mr. Warner, but by counsel.

Mr. GOULDING. That question is a little ambiguous. I think Mr. Green very frankly states, or means to state, precisely what he means. Now, if he meant that that plant, in substantially that form as it was constructed, was not constructed according to correct engineering principles,—that is to say, that plant was not properly constructed,—why, that would be a question. I should think it would be competent to show how it was improperly constructed, but I think the attempt is to compare it with some plant wholly different in construction, constructed on different principles, of different shape.

Mr. GREEN. I will ask this question. I want to avoid as much discussion as I can.

Q. How much of that 50 horse power that you mention is owing to the vertical wheels and the separation of the water plant from the rest of the plant, and to the large amount of shafting which is present in these buildings?

The CHAIRMAN. We think that is competent. You can answer.

The WITNESS. I should say that a very large proportion of it would be avoidable in the plant.

The CHAIRMAN. Never mind about that. You are asked a question. Confine yourself to what loss of power comes from what Mr. Green calls your attention to, in your opinion.

The WITNESS. I should say that, of the total power lost in shafting in that plant, seven eighths would come from the causes referred to in the question; that is, from the arrangement of the wheel plant, and particularly from the great separation,—the stringing out of the transmission of power to the several places.

Q. Did you observe whether or not the engine room floor was on the same level with the basement and dynamo building? A. It is not on the same level; but some feet higher.

Q. At the present time, under present practice, I think you stated there is some advantage in direct-connected units? A. I think that there is.

Q. As this plant is laid out, with the shafting in the basement, the wheel shafting in the basement, and the engine on the level that it is, would it be feasible to use direct-connected units there, and run them by both steam and water? A. It would require a very large amount of reconstruction of the plant in order to do it.

Q. Why? A. Because the engines are at present on a level above the wheels, the shafts that come through from the water wheels, and are back to one side, so they can be belted onto the shafting, and if both engines and water wheels were to be used with the units directly connected, it would be necessary to get them substantially into the same line. Of course one might belt to either one or the other motive power, using directly-connected units, but it would not be at all easy to arrange that plant so as to use direct-connected units throughout.

Q. Let me ask you this question. Is it a feasible thing to run the same generators both from a water wheel and from an engine? A. Feasible in what respect?

Q. Mechanically or otherwise. That is, suppose you had them practically on the same level, can you run the same generator from the same engine and water wheel? A. Under certain conditions it might be possible to do so.

Q. What are those? A. If the conditions of speed of

shaft were such that you could get direct connection of both water wheel and engine, the engine being of feasible speed for its output. Ordinarily one would more naturally have direct coupling to one power and a belt via a very short shaft to the other power. But the other arrangement could be made under favorable conditions.

Q. What do you say about the size of these buildings, doctor? A. They are of very much greater size than would be needed in modern plants of the same output, to do the same service.

Q. Would this additional size, in your opinion, give any added value to the plant? A. I should say that it did not.

Mr. BROOKS. I object, and for this reason. I understood your Honor to rule on this question of an ideal plant.

The CHAIRMAN. It was admitted under the condition that it may be ruled out by and by.

Mr. BROOKS. Perhaps that is so. But I raise this question. Do your Honors purpose to admit the testimony of what he said as to the size of the buildings, whether or not he is comparing these buildings with some buildings that he would construct? Do the size of the buildings create a loss, or are they advantageous?

Mr. GOULDING. Did that affect the value?

Mr. BROOKS. Did that affect the value? I say that is not a competent question.

The CHAIRMAN. What was that last question? I am puzzled on that. (To the stenographer.) Will you read it, please?

(The question was read, as follows: "Would this additional size, in your opinion, give any added value to the plant?")

Mr. BROOKS. Now I have got to take that in connection with the previous question.

The CHAIRMAN. The previous question? What is the previous question?

(The stenographer read the question and answer, as follows: "What do you say about the size of these buildings, doctor? A. They are of very much greater size than would be needed in modern plants of the same output, to do the same service.")

The CHAIRMAN. It strikes me that is competent, as I understand it.

Mr. BROOKS. We would like to save it.

Mr. GOULDING. Then it would be competent, if we were selling a house, an old colonial style of a house, to call a witness and have a witness testify that a house in the Queen Anne style with the same family would be a very much more fashionable house, and that affects the value of this old colonial house.

The CHAIRMAN. No, I don't think that is a fair comparison. Here is a building supposed to have machinery put in to run certain dynamos, and it is too large for its purpose. Does that affect its market value because it is too large? I think it is competent.

Mr. BROOKS. He says this is too large as compared with the mental structure that he is thinking of.

Mr. GOULDING. A modern plant.

The CHAIRMAN. No, I don't think so.

Mr. BROOKS. He says modern plant.

The CHAIRMAN. That is true.

Mr. BROOKS. As compared with a modern plant, his idea of what is a modern plant.

The CHAIRMAN. That is a matter of no great consequence, it seems to me.

Mr. BROOKS. It seems to me it is all there is to it.

The CHAIRMAN. A certain building is too large or too small; if so, how much?

Mr. GOULDING. Too large for what?

The CHAIRMAN. Too large for the machinery.

Mr. GOULDING. Too large for your modern plant.

The CHAIRMAN. Too large for the business to be carried on there, prosecuted there.

Mr. GOULDING. He did not testify, and does not pretend to testify, that it was too large for the business originally designed, according to the types at the time this was built, but it is too large compared with the modern type. That is what Dr. Bell testified to.

The CHAIRMAN. I will save your exception.

Mr. BROOKS. Well, save that exception, Mr. Stenographer, to this question and all questions of a like nature.

Mr. GREEN. What was the question?

The CHAIRMAN. What I suppose Mr. Green has in mind is, they are too large for the machinery, modern machinery.

Mr. GREEN. I think I recall the question.

Q. Does this extra size add anything to the value? A. I should say it rather detracted.

Mr. BROOKS. I object to that answer.

The CHAIRMAN. That is not strictly responsive to the question.

The WITNESS. No, it does not.

Q. Now, does it affect the value, and, if so, how? A. I think it does affect the value. It makes one more thing to keep up.

Q. Whether or not there is any need, doctor, of the work floor that they have above the dynamo room floor, for the purpose of the electric light station? A. Some space is needed for work, but only a very small fraction of the space that they have in the top of that dynamo building.

Q. That is, the floor above the dynamo? A. The floor above the dynamo.

Q. Whether or not there is space enough on the dynamo floor for the workmen? A. If one desired to put them there, there would be ample space.

Q. You spoke about the shafting, a while ago, going through the basement. Did you notice how that was belted onto the dynamos? A. It is belted up through the floor, nearly vertical belts.

Q. Whether or not that, in your opinion, affects the value of this plant? A. Those holes for belts, owing to belting up through the floor, are rather undesirable as adding to the risk from fire. Vertical belts are never to be preferred, I think, to horizontal ones. They are a little harder on the bearings on account of the weight of the belting coming right down plumb.

Q. Are there any mechanical or hydraulic reasons for having the shafting run in on the basement level rather than onto

the floor on the dynamo level? A. I see no advantage from carrying the shaft on that level.

Q. Apart from effecting a passageway, are there any hydraulic or mechanical difficulties from having the shafting run in on the level of the dynamo floor of the building? A. With the hydraulic situation as it is in that plant, it would be rather difficult to carry any shafts from horizontal wheels on the level of the present dynamo floor. If one were attempting to drive from horizontal wheels, it would be rather by lowering the level of the dynamo floor than by raising that shaft in the dynamo building.

Q. Is there any reason why the wheels could not be so adjusted as to carry the shafting in on the level? A. Level of the present dynamo floor?

Q. Yes. A. The level of the present dynamo floor would be too high for the horizontal wheels. There is no reason why the shafting could not come from the wheels and be belted sidewise or upwards; but the wheels are at too low a level from the nature of the hydraulic situation.

(Noon recess.)

AFTERNOON SESSION.

LOUIS BELL, *resumed.*

Direct examination by Mr. GREEN, continued.

Q. Have you had any occasion, doctor, to consider the question of depreciation? A. Yes, sir. That question has frequently come up in my practice, in connection with both the probable depreciation of new plants and the depreciation in old plants about which I have been consulted as to their value.

Q. Does that apply to the water and steam part of the plant as well as the electrical part? A. Yes.

Q. What are the elements, in your opinion, which enter into the depreciation of a plant such as this? A. Speaking broadly, the elements are two: First, the depreciation from age and use, the natural wearing out, in other words, of the apparatus in one way or another; and, second, and very much greater, so far as electrical plants are concerned, the depreciation due to the apparatus becoming unsuitable through change in the art to economically fulfil the functions for which it was installed. This latter depreciation is extremely marked on account of the unusually rapid growth of the electrical arts, so that apparatus has frequently had to be replaced, for economic reasons, long before age and use had made any great inroads upon its value.

Q. Do you mean the change in the art owing to inventions and improvements? A. Owing partly to inventions and improvements which make it highly undesirable to operate the old machines, and in part, also, to the fact that the change in the art has put a good many machines and a good many pieces of apparatus completely out of manufacturing, so that they are no longer to be regarded as standard. Spare parts cannot be obtained for them; repairs are only made with considerable difficulty, and the machines themselves become inconvenient to use,

apart from any question of their being inferior to more recent apparatus.

Q. Have you considered the question of the depreciation of this particular plant? A. In a general way, yes.

Q. And what elements of depreciation do you observe in this plant, if any? A. There is, of course, a certain amount of depreciation due to wear and tear in this plant. Depreciation due to wear and tear can be more or less compensated by ordinary repairs and renewals, and it depends on the amount of care and the amount of money which has been spent in keeping up the plant. This plant, as regards most of its parts, in the power station itself, that is as regards the dynamos, engines, shafting, and the water wheels, so far as I know, has been fairly well kept up. The depreciation due to age and use is not at all abnormal. The depreciation due to change in the art is, I should say, very abnormal, owing to the particular period at which this plant was put in and the rapid changes in general practice which have taken place since its installation.

Q. What was the period during which you understand this plant was installed? A. About 1891.

Q. What was there peculiar about the state of the art at that period that should affect the depreciation of this plant? A. That period from 1889, perhaps, to 1892 or 1893 was a period in which the art was changing with unusual rapidity, so far as the apparatus in use in plants like this is concerned. The small units, which had been the rule previously, were being pushed out, and larger and more economical units introduced. The alternating parts of the plant — the parts of such plants — was about that time being very rapidly changed. The alternating apparatus in use up to about 1893 was almost all in small units, almost all at a rather high frequency, 125 cycles to 130 cycles per second being common. It was practically all single phase apparatus. From 1892 and 1893 on, the tendency in new plants was to pass to a lower frequency, about 60 cycles per second, or thereabouts, and to install polyphase alternating generators, in order to avoid the necessity of running special machines for motors. The 3-wire continuous current plants

which, up to about the time this plant had been installed, were in common use, and were often installed in comparatively small plants, were being pretty thoroughly driven out in new plants by the installation of improved alternating apparatus, so that that particular type of machinery, except in large units, was quite rapidly passing out of use, so far as the construction of new plants was concerned. In the arc lighting machinery, up to about 1890 and 1891, a 50-light dynamo was about as large as manufactured; but by 1890, I think, the Brush machines were made up to 65 lights, and there began to be in use other forms of arc generators, handling as many as 80 lights from a single machine. Most of the machines put in prior to the organization of this particular plant, for arc lighting, were small machines like in size those which are in the Holyoke plant. But almost immediately after the plant was erected, the big machines for 60 and 80 lights became fairly common; and within a few years the practice has tended very strongly towards the installation of machines carrying from 100 to 125 or even 130 or 140 lights. In that respect there was a very marked change. Then the enclosed arc lamps for use on all sorts of circuits were entirely unknown at the time this Holyoke plant was installed; and, within the next few years, they began to come rapidly into use, so that at the present time the tendency toward the complete abandonment of all the open arc lamps is very, very strong, and most of the plants which are now being put in, all of the plants of which I am aware of any size, use the enclosed arcs in preference to the earlier open arcs, and many of them use alternating enclosed arcs for the larger part of their distribution, these having been entirely unknown in 1891.

The incandescent practice, as I have already stated, was changing rapidly, the tendency being, for the last eight or nine years, to use low frequency polyphase alternating circuits rather than either high frequency single-phase alternating circuits or continuous current, except in very large plants, where the service is very dense and in which direct current units have continued to hold their own.

In general, the whole art was changed, and rather sharply, in

the early nineties, from small machines, high frequency alternators, small continuous current machines, to much larger machines, to low frequency polyphase alternators. And, moreover, the change in the direction of direct coupled units was very rapid. Prior to 1890 direct coupled machines were almost unknown in this country, although they were somewhat used abroad; and since that time they have come steadily into more and more use, so that now it is the custom to employ them whenever it is feasible, and when they cannot be, for any reason, conveniently employed, the tendency is to still use fairly large units and to belt from engines directly to them, or to belt through a jack shaft of very moderate length to them, so cutting down the losses in the shafting.

Then, aside from that, there has been a general improvement in the matter of insulation of machines.

Q. Just a moment, doctor. You understand, of course, that, in the question I asked you, I do not care for anything except such as it applies to your depreciation on existing instrumentalities in this plant. A. This all applies, I think, to the question in hand. There has been a general improvement in the insulation of machines, and I think, for that reason, in their probable life. The machines now made are larger, heavier machines, as a rule. They are made with more liberal ventilation than they used to have. The strain on the insulation is less in the large high voltage machines which it has been of late years the custom to use, revolving field machines. In the last few years these have come into great prominence as enabling one to keep all the wire, through which high voltage current is passing, stationary, which is a material advantage. I think therefore that machines put in now or put in after the larger units came into common use are likely to have a considerably longer effective life, so far as wear and tear merely is concerned, than the earlier and smaller machines which were made before the art of insulation was understood quite as well as it is understood now. The same applies with great force to transformers for use with alternating currents. The earlier transformers were very inferior as compared with those made within the last five or six years, and throughout one may say

with certainty that the change in the type of machines and in the qualities of machines, except as regards electrical efficiency alone, was very rapid during the years from 1890 to 1895, which is a period of very sharp change, and that, of course, has reflected on the value of the machines which were made prior to that period as compared with those which would be now installed, or which would have been installed any time within the last five years.

Q. Do those changes, the depreciation owing to the advance in the art, as it is called, affect the valuation that you are about to give? A. Yes, it necessarily affects them as one of the factors in the depreciation.

Q. You have spoken of depreciations of machinery, transformers and various things, arc lights, owing to the advance in the art: whether or not that same line of depreciation affects the buildings? A. It affects the buildings in a somewhat different way.

Q. Whether or not it affects them? A. It affects them.

Q. In what way? A. It affects them principally by the effect on the size of buildings which are necessary for a given amount of power to be developed in an electric light station. When small dynamos were the rule, and they were all or practically all belted from long shafting, it tended to the production of large buildings, buildings spread out for the purpose of getting adequate room for this large number of small units; and with the present changes, particularly in the direction of direct coupling and direct belting from engines to dynamos, this amount of space becomes totally unnecessary, so that the building of a modern electric light station is very much smaller, relatively, than in a station which was built during the period to which I refer. That fact affects the values of the older buildings in that they become very unnecessarily large.

The CHAIRMAN. We understand that.

The WITNESS. That is all.

Q. Now, doctor, did you examine the poles and lines, the wires, the distribution system of the Company? I think you said you did. A. I examined it, not in great detail but with some care, so far as I did examine it.

Q. Will you state what you observed about it, that is, any factors that enter into your valuation of it in the way of depreciation owing to age or use or advancement of the art, in the poles and wires and the lamps? A. As regards the general condition of the pole line, it appears to me to be about what properly should be expected of a line of seven or eight or nine years in age. The life of a pole line, a wooden pole line particularly, at best is not very long, and in this case the iron poles which have been put in are suffering, I should say, more than the wooden poles: at least I examined a number of the iron poles which had nearly rusted through at the base, just where they go into the pavement. The general condition of the iron poles in that respect is such as leads me to believe that they are, have depreciated quite as much as the wooden ones. I saw some which had been taken out and piled down by the electric light station, which were rusted almost to a shell, being very thin anyhow, and rusted almost to a shell just where they entered the pavement, the point at which rusting action would be most vigorous. They are very small poles. I have never seen anywhere such small iron poles on an electric-light system, and they seem from being small and light to have shown very marked corrosion, so that I should say they were in rather bad shape. As respects the wiring, it shows evident signs of having been up for some time. The insulation is here and there somewhat frayed, though not to any very marked extent except in spots. What is more serious is the character of the way in which the wires are run. I observed a good deal more sag than is desirable.

Q. Sag, did you say? A. A good deal more sag of the wires at places than is desirable. And, furthermore, in cases where wire entered customers' places, the high tension arc light system wires and the service wires came much nearer than I should consider safe or desirable. I think that the plant would bear considerable overhauling in that particular. Moreover, the system originally, I am so informed, was a 3-wire system throughout, upon part of which the alternating current was put at a later date than its installation, and the whole wiring system is therefore of a character which properly appertains to

the older methods of distribution. That of itself is evidence that if the plant were to be brought up to date considerable reconstruction would probably have to be done.

Mr. BROOKS. We do not see, may it please your Honors, that these answers are really responsive to the various questions that are asked.

The CHAIRMAN. We shall have to examine them later. I do not see any other way. Otherwise we shall never get through. We will strike out what we find irresponsible on our attention being called to it.

Q. What advances have been made in the art, as far as the distribution line is concerned, in the wiring, method of wiring, that would affect the value of it?

Mr. BROOKS. I object to that.

Mr. GREEN. It is another way of asking how far the advance of the art has depreciated the wiring. If it is an element of depreciation as far as a wire is concerned, I would like to know what it is. To me a wire is a wire, and I would like to know how far an advance in the art could depreciate the wire system.

(Question read.)

Mr. GREEN. The witness has already testified that the depreciation affects the values which he was about to give, and this is one of the elements of depreciation.

Mr. BROOKS. I agree that he has testified in some of his answers to depreciation, but I do not agree that his answers were called for by the question.

The CHAIRMAN. There seems to be an impression in this case that if you ask a witness a question calling for his reasons, the evidence of his reasons, so long as they come within his personal observation, is not as much substantive evidence as if it is proved some other way. I understand if a man gives his reasons, they must be pertinent, legal reasons, and they are just as much evidence as if you undertook to prove them by asking a series of questions. A man is called and asked, "What is the depreciation?" He gives it. "What is your reason?" Now there seems to be a great deal of objection that it does not embody everything that is necessary. In my view I think it

does. My view of this question is, I don't know whether it is admissible or not; I will leave it to Mr. Cotter. What do you say?

Mr. COTTER. As the question is put, I do not think it is.

The CHAIRMAN. This is purely a question about wires, isn't it?

Mr. GREEN. Yes.

Mr. BROOKS. He asked what advancement in the wiring art has there been. Since I was in the political field, there has been great advancement in wiring.

Mr. GREEN. You are talking about matters you are right at home at now.

Mr. BROOKS. Yes, you are the expert I learned that from.

The CHAIRMAN. Better withdraw your objection, Mr. Brooks.

Mr. BROOKS. I guess I won't do it.

The CHAIRMAN. Mr. Green, I will hear you on the admissibility of this evidence. The witness has already testified that in all the different things, so far as I can understand it, that go to make up the appliances relating to the electric light, etc., there have been changes which affect the valuation of the plant.

Mr. GREEN. I will put this question, if your Honor please. I do not care to argue it. I am after information which I believe is legitimate in the line of what he says.

Q. What advances in the art have there been concerning the wires or the distribution system, leaving out the arc lamps?

Mr. BROOKS. I remain constant in my objection.

The CHAIRMAN. Well, I am glad to hear that.

Mr. BROOKS. Constancy has always been one of my virtues.

(The Commissioners consulted together.)

Mr. GREEN. I will put a few more questions if your Honors please. I am not going to quarrel over this.

Q. Mr. Witness, has this distribution system depreciated?
A. I should say that it had very materially.

Q. Owing to what causes? A. Owing first to wear and tear, and, second, to the fact that the art has somewhat changed.

Q. In what respect?

Mr. BROOKS. I object to that.

The CHAIRMAN. He has testified to that.

Mr. GREEN. I have not understood it if he has.

The CHAIRMAN. If he is giving the grounds and reasons of his opinion we admit it; but he need not state anything that he has already stated, I suppose.

Mr. GREEN. No, but I do not understand myself what his testimony was in regard to the advances in the art or changes in the science that have affected the value of the distribution system.

The CHAIRMAN. He may state any reasons he has not stated.

Mr. BROOKS. I had assumed that this case was tried on both sides on the theory that the plant was to be valued as of Jan. 1, 1898. I do not understand that advances in the art since Jan. 1, 1898, can be competent on the question of valuation here.

The CHAIRMAN. Whether that is so or not, there has been some evidence as to valuation since that date.

Mr. BROOKS. Not from us.

Mr. GREEN. I wish to state that we do not admit that the valuation is as of January, 1898, and do not deny it. I think that is an open question for this court to settle, and evidence was offered by our friends as to the value a year after Jan. 1, 1898; they have put in the rise in the price of materials and things of that sort.

The CHAIRMAN. Go on.

Q. If you will proceed, Mr. Witness. A. There has been depreciation owing to change in the art, for the reason that, as I have already pointed out, the main system for distribution —

The CHAIRMAN. We do not want to hear that, we have already heard it, but there was some difficulty about the wires. If that is one of the reasons that you passed upon in coming to the conclusion on the question of depreciation, the question of wires, will you please state it? I suppose that is what Mr. Green wants to get at.

Mr. GREEN. I think the witness is getting to it.

A. As regards the general system of the wires, the general system of distribution in that plant is out of date, and hence the wiring has to be judged as wiring which, however good it may be in itself or might be in itself, still belongs to a system which one would desire to change in bringing the plant up to date. Second, as regards changes in the art of wiring, so far as the installation thereof is concerned and apart from changes in methods of distribution, I do not think that the wiring done in 1891 and 1892 was noticeably inferior to that which is done to-day, so far as the mere character of the workmanship went. We had good wire then and it could be well put up. As regards some of the minor details of outside construction there has been change, but the principal change to which I refer in depreciating the wire otherwise than from age and use is that which is due to the fact that it is put up on a system which is hopelessly out of date at the present time.

Q. What form of lamps are on this system? A. For the most part Schuyler open arc lamps, their make being the same as the make of the dynamos.

Q. By the way, in regard to your experience in the installation of steam plants, will you tell us a little more fully what experience you have had with compound condensing engine plants, and so on? A. I have had occasion to go into the matter of compound condensing plants a number of times in connection with my official position in the General Electric Company. We had to make a good many shop tests of direct-connected units, and on a number of occasions the work has fallen to my lot of making a complete design for a compound condensing or triple expansion condensing steam plant for power distribution; so that I have had occasion both personally and through my assistants to come in direct contact with the work of laying out such plants, and making estimates of their performance for the purpose of distributing electric power.

Q. Whether or not you make estimates of their cost? A. Estimates both of cost and operating expense and things of that sort, for the purpose of enabling the General Electric Company or myself to submit estimates or to make bids for such plants.

Q. Doctor, considering the plant as it now is, or, rather, I shall have to ask you, before I put my question, whether your valuation on the basis of \$1,500 per mill power measured water is of January, 1898, or last fall?

Mr. BROOKS. I have heard no such valuation.

Mr. GREEN. I am going to ask him to give one, and I did not know what time he made the valuation.

A. In making all the valuations which I have made in the material which I shall submit, I have referred them to the epoch Jan. 1, 1898, or thereabouts.

Q. In January, 1898, what, in your opinion, was the fair market value of the electric lighting plant of the Holyoke Water Power Company on the supposition that no bonus was paid and measured water was drawn, paying for the same at the rate of \$1,500 per annum per mill power? A. I made an estimate of that based upon its operating charges —

By Mr. BROOKS.

Q. Based upon what? A. Based upon operative charges, as I shall presently shqw, which value included the complete plant,—in other words, a price or value set upon the whole affair, with the supposition of no bonus and rented water — measured water—at \$1,500 per mill power. That value, assuming the present load and twenty-eight restricted days in all, was \$132,392.

By Mr. GREEN.

Q. To what extent is it feasible to increase the present load in this plant in per cent.?

Mr. BROOKS. I object to that question.

The CHAIRMAN. Do you desire to be heard?

Mr. BROOKS. He certainly cannot be an expert upon the feasibility of increasing the present load, as I understand that question. That comprehends what the present prospects are.

Mr. GREEN. Oh, no, not at all; simply mechanically.

Mr. BROOKS. "Feasibility" does.

Mr. GREEN. Mechanically; how much in this plant?

The CHAIRMAN. I understood him mechanically.

Mr. GREEN. I mean entirely mechanically.

The CHAIRMAN. We admit it.

A. As to the possible increase in the load mechanically, I assume that the available power at that plant, hydraulically, is 16 mill power for whatever that amount of water may be able to put upon the shafting. At present the average load —

Mr. BROOKS. How is this responsive, may it please your Honor?

The CHAIRMAN. I don't know, Mr. Brooks.

Mr. GREEN. The witness is now stating what I should ask him after he had given his answer; that is about all. He is giving his reasons before his answer. If there is no objection I should like to have him put it in.

The CHAIRMAN. You do not object to that, Mr. Brooks?

Mr. BROOKS. No, I think not.

A. The maximum amount of power which would then be available, mechanically, for handling a load larger than the present one, would be whatever that 16 mill power of water would give. That appears to be something a little under 1,000 horse power.

Q. How do you get a little under 1,000 horse power? A. On account of losses, — I take the mill power as at 65 horse power, and there are some losses in the shafting that I have pointed out, which would reduce the available mechanical power to somewhere a little under 1,000 horse power.

By the CHAIRMAN.

Q. That is, for this 16 mill powers? A. That is the largest amount of power which would be available at any time from water. In other words, the maximum load upon the plant used as a hydraulic plant could not be carried beyond that point. In other words, having 16 mill power you cannot get any more mechanical power than that will give you. And that, I think, would correspond to an increase of about 50 per cent. over the present average and maximum load. I judge that the present maximum load — and by maximum I mean the highest load for any short period during the severest days of load, the peak of the load, during the time when the peak is severe — that at present I should judge to be somewhat in excess of 600 horse power, probably as high as 650. That being so, I do not think it likely that, using the present plant as a hydraulic plant, one

could fairly expect to be able to take on, without such extreme measures as putting in a storage battery or something of that description, more than about 50 per cent. greater load, both in the average and maximum, than is now operated.

By Mr. GREEN.

Q. Is that 600 horse power developed on the wheel? A. That is on the shafting?

Q. That is on the shafting? A. Yes.

By the CHAIRMAN.

Q. You mean at the peak you are now getting 650 effective power? A. That I assume to be the power which would be obtained; no, not 600 effective, but 600 horse power as you would obtain it by taking the power on the shafting, aside from all losses between shafting and dynamos, or in the dynamos. It is the mechanical power available.

The CHAIRMAN. All right.

The WITNESS. To add to that answer, I should think it hardly probable that mechanically one would deem it safe to take on more than about that excess of 50 per cent.

By Mr. GREEN.

Q. Assuming, then, that the average used is 50 per cent. in excess of the present load, what, in your opinion, is the value of the entire electric lighting plant, assuming 28 restricted days and with measured water at the same rates as before given? A. Inasmuch as this increase of load would somewhat improve the operative conditions, the value thus obtained is somewhat higher than the previous ones; to wit, according to the conditions which you have stated, \$138,433.

Q. In your opinion, can you get at the value of this present plant by considering what it would cost to rebuild it in January, 1898? A. I do not think that it is so possible to get at even a rough approximation to its value.

Q. What, in your opinion, is the method of finding out the valuation of this plant? A. I am of the opinion that this plant —

The CHAIRMAN. Is he about to give his reasons for the valuation?

Q. If you will, proceed to give your reasons. Tell us your line of reasoning. A. The method which I have taken for valuing this plant is based upon the fact that this plant, or any other plant which might be considered, cannot be more valuable than a new and modern plant, operated at the same total cost per annum, including all fixed charges. In other words, if a new and modern plant can be built and operated by steam, built at a certain price, and operated by steam, at given load conditions, at a certain other price, then the present plant cannot exceed the value of such a new and modern plant, but probably will fall below it by an amount which will have to be figured with reference to what difference of depreciation there may be between the two.

Q. What did you do first in considering this question? What was your first step? A. My first step, therefore, was to make a careful estimate for a new and modern steam-driven plant, to do the same service, with the same general capacity that the present steam and hydraulic plant has, and to obtain the total cost of, and the cost of operation of, such a plant. This I conceive gives the maximum limit, beyond which the value of another plant, doing similar work, particularly an old plant, cannot pass.

Q. What, in your opinion, would a new and modern plant cost in January, 1898?

Mr. GOULDING. I object to all this evidence.

The CHAIRMAN. This is subject to the same objection. All your rights are reserved.

Q. What, in your opinion, would a new and modern plant cost in January, 1898? A. A new and modern plant as of January, 1898, of similar capacity, and operating a similar load to the present plant, should have cost just about \$140,000.

Q. Have you prepared any estimates setting out the figures for that? A. I have.

Q. Let me see them. Tell us generally the capacity of a new and modern plant that would cost \$140,000. A. The capacity of the plant on which I based my estimate was a plant capable of handling 290 half arcs, 345 full arcs, and 300 kilowatts in lamps and motors.

Q. Well, let us take this up by departments. Perhaps we can follow it a little better. In the cost of your modern plant have you estimated any boiler apparatus?

The CHAIRMAN. I think that is answered in the schedule.

Mr. GREEN. If my friends here will admit it, I shall be very glad to do it in that way.

The CHAIRMAN. I think those will go in, Mr. Green.

Q. Your estimates of the cost of a new and modern plant are contained in Schedules A, B, C, D, E and F, are they not?

A. Yes, sir.

Mr. GREEN. I offer those schedules, setting out the items included in the plant of \$140,000.

(Schedules marked Exhibit 183.)

Mr. BROOKS. We object to some of these.

The CHAIRMAN. Mr. Brooks, can't that objection be taken up, and let this be printed?

Mr. BROOKS. Take, for instance, Schedule F, may it please your Honor.

The CHAIRMAN. You mean the literature?

Mr. BROOKS. Certainly.

The CHAIRMAN. Let that be stricken out, and, if competent, Mr. Green can offer it in some other way.

Mr. GREEN. I have no desire to put it in if my brother desires to have it out. It may be crossed out.

(By agreement, the following schedule, introduced at a later point in the proceedings, and containing a summary of values, is printed here for convenience.)

[EXHIBIT 194.]

SCHEDULE S.

SUMMARY OF VALUES.

SCHEDULE F. New and modern condensing steam plant	\$140,000.00
SCHEDULE K. Present steam and electric plant, based on equal cost of operation with above	63,175.00
SCHEDULE H. Present steam and electric plant from the regenera- tive cost	70,345.00
SCHEDULE P. Total value of hydraulic and electric plant, with eter- nal free water, based on present load	141,700.00
Total for hydraulic and electric plant, with eternal free water, based on 50% increased load	169,617.00
Or with 28 restricted days, capitalized at \$500 per day, at present load	127,700.00
Or at 50% increased load	155,617.00
SCHEDULE R. Value with rented water at \$1,500 per M. P., no bonus, of complete plant, present load, less 28 restricted days, as above	132,392.00
Same at 50% increased load	138,433.00

[EXHIBIT 183.]

SCHEDULE A.

COST OF MODERN PLANT.—BOILER-ROOM APPARATUS.

3 B. & W. water tube boiler, guaranteed evaporative capacity 16,000 lbs. of dry steam per hour, at an evaporating efficiency of 10.5 lbs. of water per lb. of standard coal (New River, etc.), set up .	\$7,650.00
Foundation below floor, brickwork being included above	300.00
1 green fuel economizer, of capacity as above, set up complete with all smoke connections and by-pass	2,500.00
2 duplex steam pumps, set up	500.00
Miscellaneous pipings and fittings	500.00
Tools and accessories in boiler room	200.00
	<hr/>
	\$11,650.00
Add 10%, contingent expense	1,165.00
	<hr/>
	\$12,815.00

These boilers will give steam for 1,000 I. H. P. at the guaranteed engine efficiency. Two of them will carry easily more than the peak of the present station load.

SCHEDULE B.

COST OF MODERN PLANT.—ENGINES AND ENGINE-ROOM EQUIPMENT.

1 15 in. x 30 in. x 30 in. tandem compound, 400 H. P. engine, . .	\$17,100.00
1 10 in. x 20 in. x 30 in. tandem compound, 200 H. P. engine, . .	
1 10 in. x 20 in. x 30 in. P. V. tandem compound, 200 H. P. engine, including foundations above floor	
Piping to boilers and condenser	1,500.00
Condenser, siphon type, and pump	1,500.00
Jack shaft for dynamos, complete, with pulleys, clutches, and bearings,	2,200.00
Freights and erecting of above	750.00
Belting for engines and dynamos	1,200.00
	<hr/>
	\$24,250.00
10%, contingent expense	2,425.00
	<hr/>
Total engine-room equipment	\$26,675.00

The two engines first mentioned are guaranteed for not over 15 lbs. dry steam per I. H. P. at full load and 135 lbs. pressure.

The last mentioned 200 H. P. engine is of the piston valve type, used as auxiliary only, and is guaranteed for not over 16½ lbs. steam under the above conditions.

SCHEDULE C.

COST OF MODERN PLANT.—DYNAMO ROOM, ELECTRICAL APPARATUS.

3 brush multicircuit arc generators No. 12, 6.6 amperes, 115 lamps, each at \$2,640	\$7,920.00
2 Brush machines, as above, No. 12, but 5 amperes, 145 lamps, each at \$2,640	5,280.00
2 revolving field multiphase generators, 2,300 volts, 150 k.w., each complete, with 4.5 k.w. slow speed exciters and switchboard . .	7,170.00
Foundations and setting up arc machines, including freights and carting	625.00
Foundations and setting up multiphase generators and exciters, and wiring	350.00
Arc switchboard slate	350.00
Lightning arresters, cut-outs, and miscellaneous switches, etc. . . .	500.00
Instruments, station and portable, arc ammeters (5), main alt. ammeter and volt meter, station watt meter, A. C. recording volt meter, alt. portable watt meter, ammeters (2), volt meter, resistance set, magnetos (3), testing racks, etc.	850.00
Station supplies and tools	500.00
Station wiring and fixtures	250.00
	<hr/>
	\$23,795.00
Add 10% for contingent expenses	2,379.00
	<hr/>
	\$26,174.00

Capacity, 290 half-arcs, 345 full arcs, 300 k.w. in lamps and motors.

SCHEDULE D.

COST OF MODERN PLANT.—OUTSIDE APPARATUS AND MATERIAL.

600 enclosed arc lamps	\$12,000.00
20 150-lt. transformers	1,800.00
33 meters, miscellaneous sizes, at \$30 set up	990.00
40 mast arms	600.00
Pole tops, hanger boards, etc.	1,500.00
Cut-outs, fuse boxes, break arms, etc.	500.00
1,300 30-ft. average chestnut and cedar poles, set.	6,500.00
Cross-arms, pins, insulators, pole steps, braces, and miscellaneous line material, all in place on lines	2,600.00
Weather-proof wire, about 512,000 ft., per list	8,750.00

Freights and stringing of wire	2,000.00
Miscellaneous labor, hanging lamp and connecting	1,200.00
	<u>\$38,440.00</u>
Add for extra copper for transmission, all in place on poles	3,000.00
	<u>\$41,440.00</u>
Add 10% for contingent	4,144.00
	<u>\$45,584.00</u>

This assumes the new plant to have been built carefully and economically, of good material, under careful supervision.

SCHEDULE E.

BUILDINGS AND GENERAL LOCATION OF MODERN PLANT.

Land, 20,000 sq. ft. at 5c.	\$1,000.00
Power house, 6,000 sq. ft. at \$2.50	15,000.00
Chimney (Main's figures)	6,568.00
Engine and shafting foundations	1,300.00
Coal shed, 1,500 sq. ft. at 50c.	750.00
Water connections	1,000.00
	<u>\$25,618.00</u>
Furniture and equipment for office	500.00
	<u>\$26,118.00</u>
Add 10% for contingent expense	2,611.00
	<u>\$28,729.00</u>

The chimney might be reduced in size, but for purposes of comparison it is taken as of present size, at Main's valuation.

SCHEDULE F.

SUMMARY OF COST OF MODERN PLANT.

Boiler-room equipment	\$12,815.00
Engines and engine room equipment	26,675.00
Dynamo-room equipment	26,174.00
Outside apparatus and material	45,584.00
Land and buildings	28,729.00
Total	<u>\$139,977.00</u>

Q. I see that the total cost is \$139,977, and I understand you take the round figure of \$140,000? A. Yes, sir.

Q. How would the capacity of this plant compare with the present plant? A. I should say that it would be somewhat in excess, but it is intended to represent just about the same capacity; that is to say, to work up to a thousand horse power at the peak of the load easily.

Q. How long would it take to construct a plant such as the one that you have designed? A. It would take, I should say, six or eight months, according to the vigor with which the work was pushed.

Q. Supposing it was started Jan. 1, 1898, when would it be built, in your opinion? A. If it was started the first of January, 1898, and the contracts were let promptly, and work taken up as soon as the weather permitted, I should expect the plant to be in operation by the first of September, possibly a little earlier.

Q. Now, as I understand it, having erected this plant, or having considered, rather, such a plant as this, you next did what? A. I then figured the operating expense, the complete operating expense, including all fixed charges, the producing of the present load by steam in such a plant.

Q. The total operating expenses of what? A. The total operating expenses of the new and modern plant, while producing the present load of the Holyoke station, and also when producing a load 50 per cent. in excess thereof.

Q. Do you mean by that the total expense, the total operating expenses of the steam and electric plants? A. The total operating expenses of the steam and electric plants together, and of the steam plant aside from the electric plant.

Q. What do you say it would cost to operate such a plant as you have outlined, in January, 1898, doctor, the total operating expenses?

Mr. BROOKS. What load is this?

Q. And tell us the load. A. This is on an average of 200 indicated horse power at the engines throughout the year.

Q. What would it cost? Give us the total cost, please, to operate. A. Including all charges on both steam and electric

plants, I figure that it would cost \$37,580, or very close to that figure.

Q. Have you put in schedule form the items of that expense? I have, in Schedule G.

(Schedule put in evidence, and marked Exhibit 184.)

[EXHIBIT 184.]

SCHEDULE G.

MODERN STEAM PLANT.—TOTAL OPERATING EXPENSE.

Coal, 1,670 tons at \$4 (H. A. Foster, IV. 22), in bunkers	\$6,680.00
Engineer at \$90	1,080.00
Assistant engineer at \$75	900.00
Firemen (3) at \$55	1,080.00
Electrician at \$90	1,080.00
Dynamo man at \$60	720.00
Boss lineman at \$75	900.00
Linemen (2) at \$60	1,440.00
Trimmer at \$50	600.00
Lampman at \$50	600.00
Groundman at \$45	540.00
Carbons, globes, and lamp supplies	1,260.00
Miscellaneous teaming and freights	500.00
Oil, waste, and miscellaneous supplies	700.00
Superintendent	1,800.00
Clerk	900.00
Office rent and supplies	500.00
Fixed charges (taxes and insurance, 1½%; repairs, ½%; depreciation, 4%) on \$140,000	8,400.00
	<hr/>
	\$30,580.00
Adding interest at 5% on \$140,000	7,000.00
	<hr/>
	\$37,580.00

Q. Did you state whether or not you included in that interest on the \$140,000? A. I did. A little over \$37,000; yes, sir.

Q. Where did you put this modern plant? A. I assumed nothing whatever with reference to its location, except that it should be within 10,000 feet of the present plant, following the street lines, and that there should be condensing water available at the point where it might be decided to put it. Otherwise I made no hypothesis whatever as to its location.

Q. Within ten thousand feet of this plant? A. Within ten

thousand feet of this plant, that distance being made following the streets.

Q. Did you drive out and look at this site at Jones's farm, or whatever place it is, beside the river? A. I drove out along there, and looked at what, from what has been stated in previous testimony, I judge to be this location.

Q. And of the land in that locality, what do you have to say as to the suitability or availability of it as a site for an electric light station? A. It appears, at least on a casual inspection, to be well suited to such uses, from its situation.

Q. Did you go down to the present power station of the street railway? A. Yes.

Q. Did you notice the land across the road, along the bank? A. Yes.

Q. Is that land where you could get water for condensing purposes?

Mr. BROOKS. I object to that. How does he know?

Q. How near is it to the river? A. Practically on the river.

Mr. BROOKS. He can't know whether they could get water there for condensing purposes or not.

Q. Then did I understand you to say that you considered the motive power in a modern steam plant, the cost of motive power? A. Yes, sir.

Q. And you studied that from one or more standpoints? A. Well, I took up the question of motive power, as apart from the total expense of running the plant, simply subdividing the Schedule G so as to take out the items which were properly chargeable to the motive power.

Q. What would be the cost of motive power, running on the present load? A. I make it \$17,699. Roughly, a little under \$18,000 a year.

Q. Suppose the load was increased 50 per cent.? A. It would bring the cost, the total cost of motive power, up to nearly \$20,949.

Q. Have you put your computations showing these results into schedule form? A. Yes, sir; Schedule H shows that subdivision.

(Schedule H put in evidence, and marked Exhibit 185.)

[EXHIBIT 185.]

SCHEDULE H.

COST OF MOTIVE POWER IN MODERN STEAM PLANT.

Coal, 1,670 tons at \$4	\$6,680.00
Engineer	1,080.00
Assistant engineer	900.00
Firemen (3)	1,980.00
Oil, waste, supplies, and ashes	500.00
	<u>\$10,860.00</u>
Taxes and insurance, 2%, repairs, $\frac{1}{2}$ %, depreciation, 4%, on \$56,160, being apparatus and stock and half of power house	3,650.00
	<u>\$14,891.00</u>
Interest 5% on same	2,808.00
Total	<u>\$17,699.00</u>

This is, excluding interest, \$74.45 per H. P. per year.

This is, including interest, \$88.49 per H. P. per year.

NOTE.—This steam plant will easily handle an average load 50% greater than the present load, having a peak between 900 and 1,000 H. P. At such load the operating expense would be:—

Coal	\$9,920.00
Labor	3,960.00
Supplies	610.00
Taxes and insurance	3,650.00
Repairs and depreciation	3,931.00
	<u>\$18,141.00</u>
Interest 5%	2,808.00
	<u>\$20,949.00</u>

Which is, without interest, \$60.60 per H. P. year.

Which is, with interest, \$69.83 per H. P. year.

This cost of increased load is \$3,000 less than the proposed rent of 16 M. P.

Q. I presume that this point has been clear, but I don't want any question about it. When you say that this steam plant would easily handle a load 50 per cent. greater than the present, at the peak, between 900 and 1,000 horse power, is it possible to operate this present plant, in your opinion, of the Holyoke Water Power Company, at a greater peak than 900 to 1,000 horse power? A. I should say that it would not be possible to carry it to a higher peak without either habitually running

the engines on the peak, or putting in a storage battery, or something of that sort.

Q. What do you say about water? A. The normal maximum peak would be in the vicinity of one thousand horse power.

Q. In this figure, in what you have given us, you subtract that, or you multiply 65 horse power? A. It gives 1,040 horse power.

Q. And you subtract from that? A. Subtracting an amount probably equivalent to one mill power, on account of the losses in shafting, the power available in the shafting is about a thousand horse power.

Q. That is, you subtracted \$20,949, which would be the total cost of the motive power from the rental? A. Yes.

Q. Of \$24,000, which under some hypotheses has been suggested. What did you next do? A. I then proceeded to form an estimate of the operative costs of the present plant, as stated in the testimony already given, so as to find out what the operative costs aside from fixed charges in that plant were.

Q. You say the operative costs of the present plant. By what? By what motive power? A. By steam at first.

Q. Whose figures did you take to get at this result, and what different figures did you take? A. I followed mostly the figures of Mr. H. A. Foster, taking, however, the distribution expense of the present plant from Mr. W. H. Foster's testimony, as he testified to what he actually found upon the books.

Q. That is, Mr. W. H. Foster in Vol. I., page 220? A. Vol. I., page 220.

Q. And did you take the entire distribution expenses, or did you take them less a certain amount? A. I took them less repairs, for I desired in this schedule, Schedule I, as it is labelled, to make up the total cost of operation of the present plant by steam, irrespective of all those things which I had put as fixed charges into the new and modern plant, so as to separate the operative cost in the present plant from the fixed charges, for the purpose of determining the permissive value of the fixed charges.

Q. Then you got the distribution expense less repairs from W. H. Foster in Vol. I., page 220? A. Yes.

Q. How did you get at the production expense less repairs?

A. The production expense I took from the evidence of Mr. H. A. Foster, Vol. IV., page 22.

Q. In what way did you get that 200 indicated horse power?

A. I reduced the coal of all the year round operation to the basis of 200 indicated horse power in order to compare fairly with the conditions of new and modern plant as to the amount of horse power. In other words, I wanted to compare the plants on the same basis.

Q. And having reduced Mr. H. A. Foster's production expenses to 200 indicated horse power and taking out the repairs gives you what result? A. \$10,944.

Q. To those items did you add anything? A. To those items I added the labor less the labor for repairs as given in Mr. Foster's testimony, plus one fireman, on account of the fact that for continuous operation by steam it would be desirable to operate in three shifts instead of two. And then also to that I added the cost of removing ashes, from Mr. Foster's testimony, reduced again to the basis of 200 indicated horse power, and the figures for oil, waste and supplies, found also in Mr. Foster's testimony. I followed his figures on this point closely to obtain the total cost of operating the present plant by steam, less all the fixed charges.

Q. Leaving out, then, all the fixed charges and making the reductions that you say, what is the result? What is the cost?

A. \$29,999.

By Mr. GOULDING.

Q. That is for what,—for the 50 per cent. extra? A. That is on the basis of 200 indicated horse power.

Q. What is the \$10,944? A. That is for the coal bill.

Q. The what? A. The coal bill.

Q. Oh. Now give me the total again. A. The total cost, including distribution, production, and all the items except repairs and fixed charges as given by Mr. Foster, amounts to \$29,999; practically \$30,000.

By Mr. GREEN.

Q. Do you use \$30,000 as your figure of comparison? A. I think so,—yes. It would be indistinguishable.

Q. Did you take Mr. H. A. Foster's figures in Vol. IV., page 22, with the distribution expense as given above, and take out the repairs? A. Yes, sir.

Q. And what is the result? A. That is \$30,077.

Q. And did you take the actual operating expenses as given by Mr. W. H. Foster in Vol. I., at pages 219 and 220, less, for the purpose of comparison, repairs and insurance? A. Yes, sir.

Q. And what has that given you? A. That came out \$29,639, showing substantial equality between the three figures derived.

Q. And have you put these in the form of a schedule? A. Yes, sir,—Schedule I.

(Schedule I was marked "Exhibit 186, F. H. B.")

[EXHIBIT 186.]

SCHEDULE I.

TOTAL COST OF OPERATION OF PRESENT PLANT BY STEAM.

Distribution expense, less repairs (W. H. Foster, I. 220)	\$11,038.00
Production expense, less repairs (H. A. Foster, IV. 22), coal reduced to 200 I. H. P. and 365 days	10,944.00
Removing ashes, reduced pro rata	57.00
Labor, less repair labor and plus one fireman at \$14 per week	7,280.00
Oil, waste, and supplies	680.00
Total cost, less all fixed charges	\$29,999.00

Actual operating expense (I. 219, 220), less, for comparison, repairs and insurance	\$29,639.00
Expense by steam, less repairs, as per H. A. Foster (IV. 22), and distribution expense as above	\$30,077.00

Q. Now did you state the cost of motive power by steam? That is, Schedule I, as I understand, is the total cost of operation of the plant? A. Yes, sir.

Q. That is, of the electric, the steam, the water, and everything? A. That is correct.

Q. No,—leaving the water out,—of the steam and electric plant? A. Yes, that is correct.

Q. Now did you consider and find the cost of motive power

alone by steam in the present plant? A. I did. I segregated the items of Schedule I in a similar way to that which I adopted for the new and modern plant, to cut out the cost of motive power alone by steam in the present plant.

Q. And what would that be, less all fixed charges? A. Less all fixed charges, the production cost would be \$17,049.

Q. And the fixed charges include what items? A. The fixed charges include taxes and insurance, 2 per cent. ; repairs, 1 per cent. ; depreciation, 4 per cent. .

Q. Now, how did you get at some figure on which to compute fixed charges? A. For the purpose of this comparison I assumed the average valuation of the steam plant as by Prichard, Foster, Robb, Whitham, and Newcomb, and 10 per cent. general expense thereon, which I believe those gentlemen did not add, or at least did not all of them add.

Mr. BROOKS. What is this?

Mr. GREEN. To assume a figure for the value of the steam plant on which to compute fixed charges, he took the average of Messrs. Prichard, Foster, Robb, Whitham, and Newcomb.

Mr. BROOKS. I understood that, but what is this 10 per cent. ?

The WITNESS. Plus 10 per cent. general expense of construction.

Q. You were getting at the cost? A. Yes.

Q. At a figure to use for cost? A. And also plus one half the average valuation by these gentlemen of the basement machinery, that is, the shafting. The shafting, I should say, in this plant, is an indeterminate quantity in such a computation as this, in that it is intermediate between the motive power and the production of the electric energy in the dynamo room, and I thought it fair under such circumstances to charge up one half of it with the motive power in segregating the motive power from the total expense. That is the sole reason for making that particular addition.

Q. Did you also figure interest on that sum? A. I figured also 5 per cent. interest on the same sum.

Q. Then, including depreciation, repairs, taxes, and in-

terest, what, in your opinion, would it cost to operate on those assumptions the present plant by steam? What is the cost of motive power?

Mr. BROOKS. I object to the question, may it please your Honors. I do not know of any rule of law that allows the introduction of any such valuation as that,—averaging up the testimony of several witnesses, and then adding as he pleases to it.

The CHAIRMAN. Gentlemen, we are in an ocean of figures here. Every man is asked for a schedule. In the midst of it some of us have become a little waterlogged, as it were, and drift away from following the thing with care. Personally, I think I follow both of these schedules, but it would really take a mathematician to follow all of them on both sides.

Mr. GREEN. In the face of an objection I am not going to press that question.

The CHAIRMAN. Very well.

Q. Assuming at my request for the purpose of comparison a value of \$61,432 for this steam plant, will you tell us what it would cost then to operate it?

Mr. BROOKS. That I object to.

Mr. GREEN. I think I have a right to ask this witness to assume a value.

Mr. BROOKS. My contention is that you have not a right to ask him to assume it unless there is some evidence.

The CHAIRMAN. We admit that.

Mr. BROOKS. We will take an exception.

A. Assuming this valuation of the steam plant and of one half the shafting, which I have included therewith for this purpose —

Mr. BROOKS. I did not catch that.

Q. Assuming \$61,432 as the valuation of the steam plant, including one half the valuation of the shafting, which for this purpose I have included with the steam plant, and figuring the cost of fuel, labor, and supplies, fixed charges and interest, the total motive power expense with the present steam plant on this assumption becomes \$24,420.

By Mr. GOULDING.

Q. That is, as against the \$17,049 less fixed charges? A. Yes, sir. It should be understood, however, that this figure on the present plant is for running non-condensing.

By Mr. GREEN.

Q. It is running as it is? A. It is running as it is, non-condensing.

Mr. BROOKS. You do not specify the load, I notice.

The WITNESS. The load is the same load, 200 indicated horse power, that I have taken right through for comparison.

By Mr. GOULDING.

Q. It is the same as \$17,049 cost, except that you have now added the fixed charges, which include interest, etc.? A. Yes, sir.

Q. And you have added one half the shafting to the valuation? A. Yes, sir.

Q. Of the motive power? A. Of the motive power charge, yes, sir.

By Mr. GREEN.

Q. Have you set out these computations in the form of a schedule?

Mr. BROOKS. That is the annual cost?

Mr. GREEN. Yes. The other schedule, I, was the entire operating expense. This is the expense of the motive power.

A. Yes, sir, I have set them forth in Schedule J.

Q. And you have set out in Schedule J the details of your computation? A. Yes.

Mr. GREEN. I offer Schedule J in evidence.

(Schedule J was marked "Exhibit 187, F. H. B.")

[EXHIBIT 187.]

SCHEDULE J.

COST OF MOTIVE POWER ALONE BY STEAM IN PRESENT PLANT.

Coal (Schedule I)	\$10,944.00
Removing ashes	57.00
Labor less dynamo men	5,408.00
Oil, waste, and supplies, less dynamo oil	640.00
Production, less all fixed charges	\$17,049.00
Taxes and insurance, 2%, repairs, 1%, depreciation, 4%, on \$61,432,	4,300.00
Interest 5% on \$64,132	3,071.00
Total motive power expense	<u>\$24,420.00</u>

Cost per H. P. year, excluding interest, \$106.74.

Cost per H. P. year, including interest, \$122.10.

Q. Having arrived at the operative cost of the present plant as it is by steam, and also the operative cost of a modern plant of the same capacity by steam, both running on the same load, how do you then get at any valuation of the present plant?

A. My course of reasoning is as follows: if a new and modern plant costs to operate, including all operative charges and repairs, depreciation and all fixed charges, \$37,580, as I have heretofore estimated, then, if the operative cost of the present plant by steam be, as I have estimated, \$29,999, then one could afford to pay for such a plant only such a sum as would be obtained by capitalizing the fixed charges which one could afford to pay on the present plant without increasing the total operative expense above the total operative expense obtained with the new and modern plant.

Q. Now, doctor, the cost to operate the modern plant is \$37,580, and your operating cost of the present plant is \$29,999, without any fixed charges? A. Yes, sir.

Q. What is the difference between the two figures? A. \$7,581.

Q. If you paid \$7,581 in fixed charges on the present plant, how would the operative cost of the two plants compare? A. Then the operative expenses, including all charges, fixed charges and every other, would be the same.

Q. Then if you can pay in fixed charges on the present plant \$7,581, what is the value of it on that basis? A. If you can —

Q. You capitalize it at what sum? A. I capitalize it at the fixed charge rate, which is 5 per cent. interest, and 7 per cent. for taxes, insurance, repairs, depreciation, and all other fixed charges. Capitalizing that sum, \$7,581, at that rate —

The CHAIRMAN. What rate?

Mr. GREEN. 12 per cent.

The WITNESS. The price at which the present plant would have to be acquired in order that its total operative cost should not exceed that of a new and modern plant would be \$63,175 for the steam and electric plant. The water does not enter into this computation at all.

Q. If I understand you aright, if we paid \$63,175 for the present steam and electric plant, the cost then of operating the present plant would be the same as operating your new plant?

A. Yes, sir, assuming that you operated the present plant by steam non-condensing.

Q. That is what I say, running by steam. Have you put this computation in the form of a schedule? A. I have, as Schedule K.

(Schedule K was offered in evidence and marked "Exhibit 188, F. H. B.").

[EXHIBIT 188.]

SCHEDULE K.

VALUATION OF PRESENT PLANT FROM OPERATIVE COSTS.

<i>Modern Plant (Schedule G).</i>		<i>Present Plant (Schedule I).</i>	
Total operative cost, including all		Operative cost	\$29,999.00
fixed charges	\$37,580.00	Fixed charges for equality of total	
		operating expense	7,581.00
	<u>\$37,580.00</u>		<u>\$37,580.00</u>

This means that, if the total expense of operation of the present plant operated by steam is not to exceed the total expense of operating a new and modern plant by steam, the present steam and electric plant must be bought at a valuation not exceeding a sum on which the fixed charges, including interest, shall equal \$7,581. This sum, assuming 1% greater fixed charges on the present plant than on a new and modern one, as above, is \$63,175.

Mr. GREEN. I trust that our friends will not object to that.

Mr. BROOKS. Let it go.

Q. Did you study the present plant from any other point of view? A. I examined the present plant with reference to seeing what would be the cost — probable cost — of regenerating it so that it would be substantially equivalent to a new and modern plant in efficiency and in operating expense.

Q. What elements did that involve? A. That involved the consideration of what would be done in building over the present plant, so far as its contents is concerned, to getting it somewhere nearly into line with modern practice, and somewhere nearly equivalent in its general properties to the new and modern plant which I took as a basis.

Q. To get the best results out of this plant, do you think that you would run it with the present steam plant? A. Certainly not, if it was to be run by steam as was the new and modern plant; probably not, so far as the engines are concerned, if one has to deal with any considerable number of restricted days. But I was comparing here on a basis of operating both plants by steam.

Q. This is studying the problem from the operation of both plants by steam? A. Exactly.

Q. If it was necessary to operate the present plant by steam, to what use could you put the present engines? A. If one were to take the present plant and try to get it up to date, or to within two or three years by regenerating it generally, I should think it necessary to lay aside the present engines, selling them for what price they would bring, and to put in compound condensing engines of size and type similar to those which would be used in a new and modern plant.

Q. Assuming that the City took the steam plant and electric plant but not the water plant — A. Yes.

Q. — and were obliged to run by steam, we will say, for any reason, what is the value of the engines, of the two 400 horse power engines?

Mr. BROOKS. I do not —

Mr. GREEN. I say, on the supposition that the City takes

the steam and electric plant but not the water plant, so that for any reason it is necessary to run by steam alone, what is the value of the two 400 horse power engines?

The CHAIRMAN. Subject to your objection.

Mr. BROOKS. I suppose that means second-hand value.

Mr. GREEN. Certainly. We say it is good for nothing for second-hand value.

Mr. BROOKS. Forty days' use.

Mr. GREEN. I don't care whether forty days or forty minutes.

Mr. BROOKS. No. It wouldn't make any difference to the City.

The WITNESS. On this hypothesis I should say that the value of the engines—and with this I include such of the shafting as could be dispensed with and such of the belting as could be dispensed with in putting in a new and modern plant—would be, net, about \$9,900, or, gross, about \$11,000, allowing 10 per cent. for taking down the material. The engines are of fairly saleable class, and I base my estimate on the ordinary price which such engines would be likely to bring.

Q. In your opinion, are the dynamos, armatures, and regulators that are there suitable for the purpose they are used for?

A. If I were attempting to bring the plant anywhere into line with modern practice for the most economic operation, I should sell those for what I could get.

Mr. BROOKS. I ask that that answer be stricken out.

The CHAIRMAN. Yes.

Mr. GREEN. It may be stricken out without any question. I don't waste any time on it.

Q. First of all, I will ask you whether they were suitable for the purpose they were used for? A. Certainly not.

Q. What is their value? A. Their value, it seems to me, is their value second hand, and for that I have taken the value—

Mr. BROOKS. Dynamos, armatures—

The WITNESS. Dynamos, armatures, and regulators I have taken altogether as worth, second hand, \$4,290.

Q. What would you say of the half arc lamps, transformers, and the wire? A. I should say that the arc lamps should be dispensed with and sold for their second-hand value.

Q. Are they suitable for the purpose they are used, in your opinion? A. Not if one is to run the station in a profitable and economic manner.

Q. Then, in your opinion, are they suitable for the purpose they are used? A. No, so far as that goes. Physically the lamps may give good light, but economically speaking they are not so good for the purpose they are used, not in the present state of the art.

Q. What is the value of the wire, the arc lamps and transformers? A. I have taken into consideration only one half the wire. I think that half the wire, which is the half that could be utilized to good advantage, including the renewal re-arrangement of half of it to bring it into distributing circuits such as one would use in a modern plant,—taking that one half into account, the arc lamps and transformers,—I call the second-hand value of them \$3,151. These valuations, I should say, on the dynamos, lamps, etc., are the valuations which I did not myself personally make; they are valuations taken from a careful valuation, presumably careful valuation, made by a dealer in second-hand machinery.

Mr. GREEN. That will be proven later.

By Mr. BROOKS.

Q. What does \$3,151 represent? A. That represents the value of half the wire as scrap.

Q. \$3,151? A. \$3,151 represents the value of half the wire.

Q. Which half, that is what I want, the half that you do not keep? A. The half that you sell.

By Mr. GREEN.

Q. What do you give for the wire alone? A. The computation is made in this way: I have allowed for one half the wire, scrap value in place, \$3,445. I have allowed, if you will allow me to go on, for scrap value of one half the wire, said wire being taken in place and not taken down, as it should be, to be sold, \$3,445; arc lamps, their second-hand value of about \$2 apiece; and for the transformers which are to be taken down and rejected, \$244, making a total of \$4,201; less cost of taking the stuff down and planting it on the cars for sale, \$1,050, making a total of \$3,151.

Q. And the total of the three — A. Is \$17,341.

Q. On the basis of making this plant as good as a new plant, what value do you make for the boilers? A. I think that, if I were regenerating the plant on the basis of trying to get it —

Mr. BROOKS. Don't his schedule show that?

The WITNESS. Not fully.

Mr. GREEN. The rest of it I shall put in directly. It is practically the last question I have to ask.

Q. If you will continue. A. In regenerating this plant, I have assumed that the present boilers would be retained, and something allowed for their depreciation.

Q. At what have you fixed the value? A. I have assumed they have depreciated about \$2,000, approximately one third of their value; but I think they are worth using, and consequently retained them on that hypothesis.

Q. Then, as I understand it, if you will allow me — this being obvious from the schedule, perhaps — to state the rest of your process, up to a certain point you have figured what it would cost to put in such new machinery as you think necessary in the boiler room, engine room, dynamo room, and the outside system? A. Yes, sir.

Q. And you have subtracted from that the value or amount you think you could get for the mechanism you take out? A. I have subtracted from that the credits coming from replacement of that taken out.

Q. And that brings this \$69,655 that it would cost you to remodel the steam and electric-light plant? A. Yes, sir.

The CHAIRMAN. Have you got that schedule in?

Mr. GREEN. I don't know that I have offered Schedule L in evidence. There seems to be a dearth of schedules somewhere.

(Schedule L put in evidence and marked "Exhibit 189, W. H. J.")

[EXHIBIT 189.]

SCHEDULE L.

VALUE OF PLANT FROM THE REGENERATIVE COST.

				<i>Boiler Room.</i>	
				Economizer connected	
				and up	\$2,500.00
				Extra piping and flues .	500.00
				10%	300.00
					<u>\$3,300.00</u>
				<i>Engine Room.</i>	
				Schedule B plus \$1,000	
				for foundations and	
				condenser connections,	
				plus 10% contingent	
					27,775.00
				<i>Dynamo Room.</i>	
				Dynamos (Schedule C)	\$20,370.00
				Setting	975.00
				Instruments	750.00
					<u>\$22,095.00</u>
				10%	2,209.00
					<u>24,304.00</u>
				<i>Outside System.</i>	
				Arc lights	\$12,000.00
				Transformers	1,800.00
				Hanging and recon-	
				necting	1,200.00
				Extra wiring	2,000.00
				Replacing $\frac{1}{2}$ wire . . .	5,375.00
				Replacing $\frac{1}{2}$ line . . .	4,550.00
					<u>\$26,925.00</u>
				10%	2,692.00
					<u>29,617.00</u>
					<u>\$84,996.00</u>
					<u>15,341.00</u>
					<u>\$69,655.00</u>
Two 400 H. P. engines	\$6,000.00				
Shafting and belts, etc.	5,000.00				
	<u>\$11,000.00</u>				
Less 10% for taking					
down	1,100.00	\$9,900.00			
(Ridlon) dynamos . . .	\$4,446.00				
Armatures	375.00				
Regulators	225.00				
	<u>\$5,046.00</u>				
Less 15%	756.00	4,290.00			
Half wire	\$3,445.00				
Arc lamp	516.00				
Transformers	240.00				
	<u>\$4,201.00</u>				
Less 25%	1,050.00	3,151.00			
		<u>\$17,341.00</u>			
Depreciation on boilers,					
$\frac{1}{2}$ new value		2,000.00			
		<u>\$15,341.00</u>			

\$140,000—\$69,655 equals \$70,345, value of present plant. The plant thus obtained has still less expectation of life than a new one, but would operate at about the same total expense.

Q. Now, having arrived at the sum of \$69,655 which it would cost to remodel or regenerate the present electric and steam plant, how do you arrive at the value? A. This regeneration was undertaken on the basis of trying to build up the present plant to an equality with a new and modern plant. I therefore took the \$69,655 which it would cost to make these changes, and subtracted it from the cost of a new and modern plant, to obtain the amount which one could afford to pay for the old plant if he had to spend \$69,655 to bring it up to an equality with a new and modern plant. The resulting value of the present plant upon this basis is \$70,345 for the steam and electric plant, supposed to be operated by steam.

The CHAIRMAN. I suppose if those schedules could be put in to-night — How long would it take you, Mr. Green?

Mr. GREEN. Oh, I should think I could get them in by six o'clock.

The CHAIRMAN. I have an engagement at half past four. I thought possibly you might hand your schedules to Mr. Brooks to-night if he wanted them to look over.

Mr. GREEN. I don't know whether that would shorten the case or lengthen it. I will look them over. I don't know as we have any objection at all.

The CHAIRMAN. Quarter of 10, then, to-morrow morning.

(Adjourned to Tuesday, March 19, 1901, at 9.45 A.M.)

SIXTIETH HEARING.

BOSTON, Tuesday, March 19, 1901.

LOUIS BELL, *resumed.*

Direct examination by Mr. GREEN, continued.

Q. Doctor, I understood you, in your testimony yesterday, to say that you considered the question of water power in connection with this plant. Will you tell us how you arrived at the value of the water power? A. I arrived at the operative value of the water power by considering that the total annual charge which could be paid for permanent water power in this, or, for that matter, in any other plant, is that amount which, added to the operative expenses by water alone, would make a sum equal to the total cost of operation by a steam plant. In other words, if water has any advantage as a motive power, it is in the lessened cost of operation. The computation is that which I have already used in Schedule K, and it amounts to this: The total charges for operation of a new and modern steam plant, with the load on the present Holyoke station, at its present load, would be about \$37,580. Now, the labor and supplies due to operating a water plant, and in this I have followed Mr. H. A. Foster,—I mean the particular water plant in question,—amount to \$3,725 per year. This covers the labor and supplies outside of the distribution expense, Mr. Foster having divided the total charges into production and distribution. The distribution expense, less repairs and such items, which I have considered in fixed charges, amounts to \$11,038. This is also per Mr. Foster. Now, the total annual charge which could be paid for permanent water power, including all the charges against that water power, without bringing the total cost of operation higher than the cost of operation by steam, is the balance between \$37,580 and the quantities which I have just

stated; and that balance charge is \$22,817. Now, to get at the value of the water itself, the cost of the water power, this balance charge must be reduced by the total fixed charges on the electric plant, that having been considered on the other side of the balance sheet already, less the steam plant, which would be needless with permanent water. By that I mean to say that, if we had water all the year around,—every day in the year and all day, and delivered right there at the centre of distribution,—there would be no occasion for installing this steam plant. In point of fact, I should call attention to the fact that, inasmuch as there is an annual shut-down in the case of this Holyoke plant, the person who uses the water power at that plant for electric lighting purposes is saddled with the cost of a steam plant, because an electric light plant cannot be shut down and go out of business for four or five days or a week in the year. But I have left that out of this present computation. For the purpose of this computation I have taken the total valuation of the electric plant from Foster, as before,—Mr. H. A. Foster,—and he places it at \$121,691.

By Mr. BROOKS.

Q. How much is that? A. \$121,691. Charging the fixed charges, as before, against that, the result is the sum for fixed charges against the electric plant, \$14,603. Subtracting this from \$22,817, the total balance charge in favor of water, there is left the sum of \$8,214, which is the total annual sum, including all fixed charges, which can be paid for water power assumed permanent, and of an amount adequate to the assumed output of the plant. That assumes the water to be permanent water, and that must include not only any rents, or other price paid in some form, for the water power, but all the fixed charges against the water plant. Otherwise, if the sum of these was greater than \$8,214, it would lift the cost of operation above that of operation by steam, and this schedule is made on the assumption that there is no object in using water when you can use steam at the same or a lower cost. Now I have thought it fair, as in the previous schedule, to consider the possibility of increasing the present load, inasmuch as the value of water power to a given concern depends very largely upon the extent

to which it can be utilized. If it can be utilized to every horse power, every hour, every day in the year, it is worth more to them than if it can only be utilized in a fragmentary way at certain times in the year. Therefore I have considered that. I have assumed that it may be possible to increase the load on this plant by 50 per cent.

The CHAIRMAN. Now, Mr. Witness, I don't wish to interrupt you, but you explained all that 50 per cent. to us yesterday. The propositions that are self-evident we don't care to have elaborated. I am not criticising your evidence, but simply to save the time.

Mr. BROOKS. We desire to interpose an objection, may it please your Honors. I don't care to interrupt him, but we want to interpose an objection to this line of testimony, taking the testimony of somebody else in part, and then drawing his conclusions from it. We say it is nothing but argument.

The CHAIRMAN. If you don't care to have him assume Mr. Foster's valuation, then Mr. Green can put it in in another way. I didn't suppose your objection was to that. He can put it in the other way, assuming the plant is worth so and so.

Mr. BROOKS. I don't care about that. I am not taking Mr. Foster's valuation into consideration, but he simply says, "I take Mr. Foster's figures for the cost of supplies, and one thing and another, that go into the annual cost of this. I take his figure, and compare it with the total annual cost of my ideal plant."

The CHAIRMAN. I think, Mr. Brooks, the best way to do is to let it go in, and consider it later. What I have said doesn't reflect on this witness in the slightest degree, but I think we can get along faster in this way. In fact, most of these things are contained in the schedule, and are put in in the schedule, but if you desire to ask him any special questions, Mr. Green, about this, you may about the schedule.

Mr. GREEN. I am not offering any schedule of this.

The CHAIRMAN. Very well. Now we will go ahead.

The WITNESS. Now, therefore, assuming this 50 per cent. increased load, I have computed that the cost of operation in the new and modern plant would be increased by about \$3,250

by that 50 per cent. increased load, which, added to the cost of operation which I have just given as \$37,580, and making the balance of cost of operation by the water plant as before, would raise the balance charge to \$26,077, and the annual sum which could be paid for water, including fixed charges, to \$11,474. Subtracting from this the fixed charges on the water plant itself, to obtain the value of the water, and taking Mr. Foster's valuation of that water plant, the annual value of the water alone at 50 per cent. increased load is \$4,503, and for permanent water, or \$1,243 at the present load. That is, if one subtracts the fixed charges on the water plant, assuming Mr. Foster's valuation at the present load, there would be a slight advantage in running by absolutely permanent water at present load, and the whole 16 mill powers would figure up to about \$4,500 a year.

Mr. BROOKS. Excuse me a moment. What does the \$4,500 a year represent?

The WITNESS. That represents the total charge for water which one could afford to pay without bringing the water cost above the steam cost, provided the load were increased 50 per cent. above the present load, and the water plant physically were acquired at Mr. Foster's valuation. That is for entirely permanent water without any question of steam plant entering into it.

By Mr. GREEN.

Q. And on the same assumption, \$1,243 at the present load? A. Yes, sir.

Q. 200 indicated horse power. Have you put the details of a part of this computation into the form of a schedule? A. Yes, sir. It was a little bit intricate, and I thought it would be advisable, and the schedule is —

Mr. GREEN. When I said there was no schedule, I hadn't looked ahead. There is a schedule as a part of this work.

The WITNESS. The Schedule O gives a portion of this work.

Mr. BROOKS. We have not had Schedule N.

Mr. GREEN. We have had Schedule M this time, have we not?

Mr. BROOKS. We have not had Schedule N or M.

Mr. GREEN. Well, I don't care to — We will take this (Schedule O) now at any rate, as long as you have got started on it.

(Schedule O put in evidence and marked "Exhibit 190, W. H. J.")

[EXHIBIT 190.]

SCHEDULE O.

VALUE OF PERMANENT WATER AT PRESENT AND INCREASED LOAD.

Cost of motive power at 50% increase in load (Schedule H)	\$14,210.00
Cost of motive power at present load (Schedule H)	10,860.00
Added cost	\$3,350.00
Balance charge for equal operative cost, present load	22,817.00
Balance charge at 50% increased load	\$26,077.00
Less fixed charges of Foster's valuation of electric plant	14,603.00
Annual cost of water power, including fixed charge	\$11,474.00
Fixed charge on water plant, per Foster	6,971.00
Annual value of permanent water at 50% above present load	\$4,503.00
Annual cost of water power, including all fixed charges, at present load	\$8,214.00
Fixed charge on water power, as above	6,971.00
Real value of absolutely permanent water, present load	\$1,243.00

If, therefore, the plant were acquired at the valuations alleged by Foster, the annual value of absolutely permanent water, as based on costs of motive power, falls at present load to \$1,243, or to \$4,503 even if the load were increased 50%, which would imply the full utilization of the 16 M. P. allotted to the present plant.

The CHAIRMAN. What the computations say is worth \$2,400 you say at present is worth \$1,200, and may be worth \$4,500.

Mr. GREEN. Yes, sir, if we had a business that would use the full mill powers it would be worth \$4,500, as I understand.

Mr. BROOKS. Will you excuse us just a minute?

The CHAIRMAN. Yes.

Mr. BROOKS. This schedule, as your Honor sees, refers to two other schedules, and they are not in.

The CHAIRMAN. M and N.

Mr. GREEN. M is nothing but a statement—perhaps that ought to be added—of what the witness has stated verbally.

Mr. BROOKS. Without Schedule N, too.

The CHAIRMAN. If you have got to cross examine, you ought to have those.

Mr. GREEN. Schedule N is simply what he has stated.

The WITNESS. I think there is reference to Schedule N in Schedule O. I don't remember.

Mr. GREEN. I see. Strike out the expression "Schedule M" in this (Schedule O).

The WITNESS. I took that from Mr. Foster's testimony.

Mr. GREEN. I should like to have the line from Schedule M eradicated. (The references to Schedule M in Schedule O were stricken out.)

The CHAIRMAN. Go ahead.

Mr. BROOKS. If you will just wait a moment.

Mr. GREEN. You might strike out Schedule N, inasmuch as it seems to me it is open to objection. While he put that statement in schedule form, I had him make the statement as a matter of form, and do not care to have him make a schedule in addition to what he has testified orally.

The CHAIRMAN. You say you are not going to put in M and N?

Mr. GREEN. No, sir.

The CHAIRMAN. Then call this Schedule O.

Mr. GREEN. Yes, might just as well.

The CHAIRMAN. All right.

Mr. BROOKS. I should like to ask Mr. Green what is the total value of the entire plant.

Mr. GREEN. We are coming to that. If you will wait just a moment, we are coming to it.

Mr. BROOKS. See if I am right about it, in all its parts, water plant, steam plant, electric plant, land and everything.

The CHAIRMAN. Yes, I should like to know.

Mr. BROOKS. Upon which he bases his value of permanent water, in one instance, of \$1,243, and in the other of \$4,500, and the items that make it up.

Mr. GREEN. He has already stated that its water is rented at \$1,500 a mill power, no bonus. The plant, on the basis of 28 days' restricted load, is \$132,392; and at 50 per cent. increased load on the same assumption, and using the water up to the limit, \$138,450, these figures will lead up to an entire valuation of the entire plant as cash value, no future rent on two assumptions.

Mr. BROOKS. That was what I think he meant. As I understand, he has taken Mr. Foster's valuation of the entire electric plant and has made Schedule O, assuming that if Mr. Foster were correct—Am I right about that or wrong?

Mr. GREEN. I think now, perhaps, if we pass on to finish these schedules, you can inquire into that fully.

The CHAIRMAN. I think Mr. Brooks is correct about that.

Mr. GREEN. I should rather let the witness answer it, then, and have Mr. Brooks put it to the witness.

Mr. BROOKS. I prefer to ask you.

Mr. GREEN. It is perfectly proper. I think he has assumed, for the moment, Mr. Foster's valuations, in one or two instances, in getting at charges.

Q. Will you state what you did?

The CHAIRMAN. I think that is a practical question right here. What do you understand, Mr. Green,—that is, in your mind,—what do you understand your people, any of them, value the entire electric plant, including things just as they are?

Mr. GREEN. We have had two valuations, one of \$138,000 and one of \$150,000, on the electric plant, the whole thing.

The CHAIRMAN. The whole thing?

Mr. GREEN. The whole thing, with measured water.

Mr. BROOKS. You mean by that the electric plant?

Mr. GREEN. No, I mean the electric, steam, and water plant, and with measured water, has been given by one witness at \$138,000.

The CHAIRMAN. \$132,000.

Mr. GREEN. And Mr. Blood, \$138,000.

The CHAIRMAN. Now, what do you understand—I do not carry it in my mind, it has sort of dropped out of my mind—

Mr. GREEN. Yes, sir.

The CHAIRMAN. What do you understand the petitioners' evidence, generally speaking, what do they claim outside the question of earning capacity?

Mr. GREEN. My recollection is that they figure up what it would cost to rebuild this, and put in figures of about—How much was it, Mr. Brooks? I would rather you would state your own figures.

Mr. BROOKS. —about \$330,000.

The CHAIRMAN. \$320,000?

Mr. BROOKS. I think something like \$330,000, beside the cost of 313 days' rental per annum for mill power.

The CHAIRMAN. You say that all you ought to pay is \$132,000 or \$133,000 to get the full mill power.

Mr. GREEN. With measured water.

The CHAIRMAN. With measured water.

Mr. BROOKS. I understand this witness that he assumed Mr. Foster's valuation of this entire plant as the basis of his figures, and of \$1,243 and of \$4,503.

Mr. GREEN. Now let the witness state.

The WITNESS. I think I can set that matter right in a moment. In this schedule (O), after computing the balance charges—

Mr. BROOKS. Which schedule do you refer to?

A. Schedule N or Schedule O, either. After computing the balance charge to bring the cost of water power up to the cost of steam power, there would be contained in that balance charge all the fixed charges against the plants. Well, now, merely for the purpose of segregating the value of the water as such from the rest of it, I have to assume somebody's values of the rest of the plant aside from the water plant, in order to get values for the fixed charges, to obtain finally the value of the water; and for that purpose, and for that purpose only, I assumed Mr. Foster's values which lead to that particular value of the water, and it should be understood that that particular value of the water applies to the case where Mr. Foster's valuations of the physical plant are used for obtaining the fixed charges thereon.

By Mr. BROOKS.

Q. Your \$1,243 for the value of the permanent water per annum is based upon Mr. Foster's valuation of a certain portion of this entire plant? A. Yes, sir. That assumes substantially that the electric plant and the water plant are acquired at Mr. Foster's valuation.

By the CHAIRMAN.

Q. \$121,000? A. \$121,000 and \$77,000, I think, respectively. Then that leads to the value of the water, which is, in the one case, \$1,243, and in the other \$4,500. But it should be remembered that in this particular schedule I have not introduced any value of a steam plant, whatever that is,—the water is taken as permanent water, as if there were no conditions that would call for a steam plant; it is the permanent water rather than the non-permanent water.

Mr. BROOKS. I would like to know now how much of this last valuation of Mr. Foster he assumes for the purpose of obtaining his \$1,243 as the annual value of the water power. I don't believe anybody understands that; I don't.

The WITNESS. I assume for the purpose —

The CHAIRMAN. Why don't you tell what portion of the valuation you assume? That will cover the whole thing.

The WITNESS. I am going to. I, for that purpose,—the purpose of valuing the water power as water,—took Mr. Foster's valuation on the electric plant and on the water plant, in the one case, \$121,691, for the electric plant less the steam plant, and in the other case \$77,000.

By Mr. BROOKS.

Q. You say how much? A. \$121,000 and \$77,000 substantially.

Q. That is, you assumed the valuation, in order to obtain your \$1,243, you assumed a valuation for the electric plant and the water plant of \$198,000? A. Yes, sir. In other words, this computation simply indicates that if that part of the plant were bought for \$198,000 you could then afford to pay, at the present load, \$1,243, or 50 per cent. increase, \$4,503, for absolutely permanent water.

The CHAIRMAN. It is perfectly clear to my mind. I did not understand it. I think it is cleared up some.

The WITNESS. Is that entirely clear, Mr. Brooks? I may be a little blunt this morning, but I want to be clear.

The CHAIRMAN. Now, Mr. Green, go ahead.

By Mr. GREEN.

Q. That is for absolutely permanent water? A. Yes, sir.

Q. Did you follow this on the same assumption to get the value of non-permanent water? A. I did, yes, sir.

Q. Will you tell us what the non-permanent water would be worth?

The CHAIRMAN. What is the amount? Give us the amount.

The WITNESS. May it please the Commission, I cannot very well give the gross amount, which happens to be a negative quantity,—

The CHAIRMAN. I supposed it was, on your calculation.

The WITNESS. — without explaining the process by which I obtained it —

The CHAIRMAN. All right.

The WITNESS. — the process by which I obtained the non-permanent water power. Considering that non-permanent is less valuable than the absolutely permanent water power of Schedule N and Schedule O by the amount of fixed charge on the steam plant which has to be carried on account of non-permanence, plus the difference, if there be any, between the cost of operation on restricted days and the rebate which may be allowed for those days,—for this purpose, for the purpose of the computation, I took the steam plant according to Mr. Foster's valuation, which is \$48,442; and on that the fixed charge is \$5,813. Now I obtained, in Schedule N and Schedule O, \$8,214 as the total annual sum, including fixed charges, which could be paid for permanent water power. Now, if the steam plant has to be carried, that amount is reduced by the fixed charges on the steam plant, and subtracting \$5,813 from \$8,214 I obtained \$2,401; but that sum is less by \$3,570 than the fixed charges on the water plant, based on Mr. Foster's valuation, so that the added annual charge due to the necessity

of carrying the steam plant, on account of the non-permanence of the water supply, wipes out the value of the water, the values of the plant being taken at Mr. Foster's valuations. And then I repeated the same process for the 50 per cent. increased load; and, again, as will appear in Schedules Q and R, the value of the water for operative purposes is wiped out by the fixed charges, supposing as before the plant to be acquired at Mr. Foster's valuation.

Q. Is this computation set out in Schedule P? A. This computation is set out in Schedule P.

Mr. BROOKS. Value of non-permanent water as compared with the permanent that you have, just give it.

Mr. GREEN. Q and R should be stricken out. It is Schedule P.

The WITNESS. If I may be pardoned, when I came to Schedule P, that is, all the valuations of the physical parts of the plant are taken according to Mr. Foster.

The CHAIRMAN. Well, let us have it.

Mr. BROOKS. On this last schedule it shows annually \$2,100 less than nothing?

The WITNESS. Substantially that.

The CHAIRMAN. Mr. Witness, we don't want a long explanation about this case. What does this show in dollars and cents?

The WITNESS. It shows in dollars and cents that, if the physical plant be acquired at Mr. Foster's valuation, the value of the water is less than nothing.

By the CHAIRMAN.

Q. How much less? A. About \$1,200.

By Mr. BROOKS.

Q. \$1,220 per annum? A. Per annum.

Mr. GREEN. And that is on the basis of 50 per cent. increased load.

The CHAIRMAN. What does this mean, "permissible total annual charge, non-permanent, \$2,401"? Do you take the balance between that and the next fixed charges?

Mr. GREEN. Your Honor will excuse me. The confu-

sion arises because the numbers are not the same. Now I think it will be clear, if your Honor will ask any question that you wish of the witness. The confusion has arisen from the fact that there was one schedule which he had, P, which was in the line of the questions; and I had him therefore — he has now Schedule P.

The CHAIRMAN. Is this the one?

Mr. GREEN. Now that is right. He was using another schedule, P.

The CHAIRMAN. All right.

(Schedule P put in evidence and marked "Exhibit 191, W. H. J.")

[EXHIBIT 191.]

SCHEDULE P.

VALUE OF NON-PERMANENT WATER POWER COMPARED
WITH PERMANENT.

Annual charge for permanent water power, including fixed charges, for equality of cost with that of steam power at present load . .	\$8,214.00
Fixed charge on steam plant at Foster's valuation	5,813.00
Permissible total annual charge for non-permanent water, including fixed charge.	\$2,401.00
Fixed charge on water power, Foster's valuation	6,971.00

This is greater by \$5,344 than the whole amount permissible to be paid for water if non-permanent.

Gross permissible value of permanent water at 50% increase over present load	\$11,564.00
Fixed charge on steam plant, as above	5,813.00
Permissible total charge if non-permanent	\$5,751.00
Fixed charge on water power, as above, which is greater by \$1,220 than the whole payment permissible	6,971.00

By Mr. GREEN.

Q. Will you explain, doctor? A. Explain Schedule P?

Q. Yes. A. The annual charge for permanent water power, as found in Schedules N and O, for equality of cost with steam power, would be \$8,214, as seen before. Now, if the power is non-permanent, there must be subtracted from that the fixed charges on the steam plant. Now I have taken these, as in the previous questions, at Mr. Foster's valuation; and they amount to \$5,813, which leaves \$2,401 as the permissible total annual charge for non-permanent water, including the fixed charges on the water plant. That is, \$2,401 is all that can be paid for the water in the way of annual payments, including the fixed charges, provided you have to carry the steam plant at Mr. Foster's valuation, on account of the non-permanence of the water. Well, that \$2,401 is less by \$5,344 than the fixed charge on the water power taken at Mr. Foster's valuation. So that, if one acquired the whole plant which has now come under consideration, except the bonus for the water rights,—if one acquired the whole plant at Mr. Foster's valuation, then operating it by non-permanent water power would leave the user in the hole by about \$5,000 a year, as compared with the new and modern steam plant. That is the purport of the first part of that schedule. The second part is exactly the same thing as regards an increase of load of 50 per cent.; and, the water power being more valuable for that purpose, the user acquiring the plant at Mr. Foster's valuation would still be somewhat at a disadvantage as compared with steam in a new and modern plant, but very much less so than in the case of running at the present load, being \$1,220 as against about \$5,000.

Mr. GREEN. Does that make it clear, if your Honor please?

The CHAIRMAN. Yes.

Q. Now, professor, did you proceed from this point to get at a valuation of this plant with non-permanent water? A. I did; yes, sir.

Q. And in the valuation that you are about to state, did you use any of Mr. Foster's valuations? A. I used his valuation of the —

The CHAIRMAN. I wish, instead of introducing Mr. Foster's valuation, you would assume a valuation of your own.

Mr. GREEN. I was going to say, if there is any objection in putting it in the form of Mr. Foster's valuation, if they don't care for that, it is a little shorter way of following the figures and referring to the testimony.

A. In this case of working out the valuation of the plant with non-permanent water, I took the steam plant at Mr. Foster's valuation.

By the CHAIRMAN.

Q. How much? A. \$48,000 and some odd dollars.

The CHAIRMAN. Yes, that is near enough.

The WITNESS. Now, the annual balance charge as in Schedule N, based on the annual cost at the present load, was \$22,817, the figure which I have used before.

By Mr. GREEN.

Q. This is running this plant in comparison with your new and modern plant? A. In comparison with a new and modern plant. Now, the fixed charge, due to carrying the steam plant, at Mr. Foster's valuation, is \$5,813, so that the annual balance charge, when carrying the combined steam and water plants, would be \$17,000,—\$17,004. Now, capitalizing this at the fixed charge rate, just as has been done before, the value of the plant, excepting, of course, the steam plant, which has been already put into this valuation, with the eternally free water, no charge whatever against the water of any kind, would be \$141,700.

Q. Just a moment. That is the valuation, as I understand it, of the water and electric plants complete with the eternally free water? A. Water and electric plants complete with eternally free water.

Q. What rate did you capitalize that? A. That was capitalized —

Q. Is that shown in Schedule K? A. 12 per cent., I think. (Schedule Q put in evidence and marked "Exhibit 192, W. H. J.")

[EXHIBIT 192.]

SCHEDULE Q.

VALUATION OF PLANT WITH NON-PERMANENT WATER.

Annual balance charge based on annual costs at present load . . .	\$22,817.00
Fixed charge due to carrying steam plant at Foster's valuation (Schedule P)	5,813.00
Annual balance charge when carrying combined steam and water . .	\$17,004.00
Capitalized at fixed charge rate, as in Schedule K, the value of the complete plant with eternal free water amounts to	141,700.00
Balance charge at 50% increased load	\$26,167.00
Fixed charge on steam plant, as above	5,813.00
Balance charge when load is 50% increased	\$20,354.00
Capitalized at fixed charge rate as above, the value rises to	169,617.00

This last value represents the equitable value of present plant with eternal free water, supposing this water to be fully utilized on the basis of 50% increase in average load, provided the rebate fully covers the cost of running on restricted days. Subtract \$500 from above for each day of restriction with measured water.

Q. And in the fixed charges do you include interest? A. Yes.

Q. You put in the interest and the taxes? A. Interest and all the fixed charges, depreciation, taxes, insurance, and water rights. Now, the same computation made at 50 per cent. increased load, as above, leads to the value of \$169,817, which represents the value of the present hydraulic and electric plant with eternally free water, supposing the load to be 50 per cent. over the present load, and supposing that the rebate paid on account of non-permanence on restricted days fully covers the cost of running on restricted days.

Q. Does it in point of fact? A. In point of fact it does not. The difference would be, roughly capitalized, \$500 for each day of restriction, which quantity should be subtracted from the \$169,617, in the case of computing the value where there are a certain given number of restricted days.

By Mr. COTTER.

Q. Why did you capitalize at 12 per cent.? You may have stated it.

By Mr. GREEN.

Q. Explain again. A. That, sir, was the fixed charge, the rate taken for the fixed charges on the plant which would have to be carried, and which comes into this branch of the computation. It includes 5 per cent. interest, and 7 per cent. for all other fixed charges.

Q. You are stating this from an operating standpoint? A. From an operating standpoint.

Q. I think it is apparent enough, against the operation of a plant you charge for the fixed charges and interest. A. Charge for the fixed charges and interest, just as much as for the labor and the coal, lights, and everything else.

Q. Therefore you used the fixed charge for capitalization? A. Yes, sir.

Q. Will you find in Schedule K just the amount that Mr. Foster takes for the steam plant?

Mr. BROOKS. What do you mean, "takes for the steam plant"? You mean value of the steam plant?

Mr. GREEN. Yes.

Q. Is it Schedule K? A. No, it is Schedule P.

Mr. GOULDING. I don't see any Schedule Q that answers the question. The question of Mr. Green was what is the value of this plant with non-permanent water? He says it is so and so, but with water eternally free, whatever that means.

The WITNESS. That means water on which there is no charge further to be paid to the present owners of the quantities thus acquired.

The CHAIRMAN. If I understand, permanent water is something guaranteed by the Almighty. Is that your understanding?

Mr. GREEN. No, sir. In order to get at the value of non-permanent water, or to study the question, the witness had to start at permanent water.

The CHAIRMAN. The expression "eternally" I don't understand.

Mr. GREEN. If your Honor please, this is a valuation of the plant, provided we paid no water rent and pay cash down for the whole thing.

The CHAIRMAN. You have got \$169,000. You get everything scot free.

Mr. GREEN. No, sir; we get everything except the steam plant. We get the water plant and electrical plant. Now, to this, in order to get the whole plant without any further rent, should be added, as I understand, one value.

The WITNESS. About \$48,000 should be added to that to include the steam plant. This is for the hydraulic and electric plants. That brings it to a little over \$200,000.

The CHAIRMAN. All right, that seems plain to me.

Q. Whatever the figure is, Mr. Foster's valuation, if that is added to these two results, then you get the value of the entire plant on each of the two assumptions, with free water, that is, no further rental to be paid? A. Yes, sir.

Q. Cash valuation of the whole thing complete. Have you studied this proposition also from the standpoint of measured water? I think you have, as that was the first valuation given.

A. I beg your pardon. The exact valuation of Mr. Foster's valuation of the steam plant is \$48,442, which I think completes the figures. What is your question?

Q. You stated, as I recall, the valuation of the entire plant on two assumptions, one on the present load of about 200 indicated horse power, and the other 50 per cent. increased, measured water. Will you tell how you worked out those results, please, or obtained those results, and the reasons for that? A. I did consider the value of the plant with measured water at \$1,500 per mill power, as you indicate.

Mr. BROOKS. Is this the valuation of \$132,000 and some odd dollars?

The WITNESS. That is the valuation, \$132,000 and \$38,000 respectively. This computation was made in precisely the same way generally as the previous ones, by balancing against the cost of power in a new and modern plant the steam plant costs, the old figure of \$37,580.

By Mr. GREEN.

Q. Is that the present plant or a new plant? A. That is the new and modern plant.

Q. The new and modern plant? A. Total cost of opera-

tion, including all charges. Against that I have set the labor and supplies on the water power as per Foster.

Q. That is, Mr. Foster, the accountant? A. That is, Mr. Foster, the accountant, I think. It is a statement of fact and not an estimate, I think, in any case. The distribution cost is also obtained from the reports of the Company, \$11,038, the insurance and repairs, I think, coming out of that, being taken out of that in order to put all the fixed charges into the balance charge where they belonged; and then I have added \$5,250 for the rent of $3\frac{1}{2}$ mill power, assuming the measured water roughly at $3\frac{1}{2}$ mill power in round numbers.

Q. At \$1,500? A. At \$1,500 per annum. Those charges add up to \$20,013, which, subtracted from the total expense by a new and modern plant, leaves a balance of \$17,567. This, capitalized at the fixed charge rate as before, gives —

By Mr. BROOKS.

Q. At what? A. Capitalized at the fixed charge rate, as before —

Q. That is, 12 per cent.? A. That is, 12 per cent. — gives \$146,392; and for the non-permanence of the water, this must be reduced by the unrebated cost during the restricted days capitalized. That I have just stated to be about \$500 per day. In other words, for each restricted day there is a loss due to insufficient rebate, which, capitalized, amounts to — capitalized at 5 per cent. in that case — amounts to about \$500. Now, taking 28 as the total number of restricted days, and subtracting from the figure just given the \$14,000 which result from those 28 restricted days, brings the net value to \$132,392 at the present load. Under the conditions of a 50 per cent. increase, the steam plant total cost, new and modern plant, would rise to \$40,930, the rented mill power to be paid for to 5 1-4, which brings up the total charge against the water power to \$22,638, and the balance charge bringing it to an equality with steam, new and modern plant, to \$18,292, and subtracting from that the capitalized loss owing to 28 restricted days leaves \$138,433. This value, \$138,433, comes very near to the value estimated for the cost of a new and modern steam plant, which would suggest that the \$1,500 per mill power rent compares

with steam power on nearly equal terms at 50 per cent. increase over the present load.

By Mr. GREEN.

Q. That is, measured water? A. Measured water, yes, sir.

Q. Are those computations set out in Schedule R? A. Yes, sir, they are.

(Schedule R was marked "Exhibit 193, F. H. B.")

[EXHIBIT 193.]

SCHEDULE R.

VALUES OF PLANT WITH MEASURED WATER AT \$1,500 PER M. P.

		<i>Water Power.</i>	
Steam plant cost	\$37,580.00	Labor and supplies	\$3,725.00
		3.5 M. P.	5,250.00
		Distribution cost	11,038.00
		Total	\$20,013.00
		Balance charge	17,567.00

This balance charge, capitalized at the fixed charge rate, equals \$146,392, which must be reduced by the unrebated cost during restricted days duly capitalized. Thus,

gross value	\$146,392.00
28 restricted days at \$500	14,000.00
Net value	\$132,392.00

This is at present load. Under the condition of a 50% increase the balance would stand as follows:—

		<i>Water Power.</i>	
Steam plant cost	\$40,930.00	Labor and supplies	\$3,725.00
		5.25 M. P.	7,875.00
Gross capitalization	\$152,433.00	Distribution	11,038.00
Less 28 days at \$500	14,000.00	Total	\$22,638.00
	\$138,433.00	Balance charge	18,292.00

This value, as compared with that of a new and modern plant, would indicate that measured water at \$1,500 per M. P. rent, without bonus, compares with steam power on nearly equal terms at 50% increase over present load.

Q. Referring to Schedule P, you stated the cash value of the hydraulic and electric plants, no further rent to be paid, on the basis of the present load, and again on the basis of 50 per cent. increase. You did not consider there the 28 restricted days. Will you state on the assumption of 28 restricted days what those are worth? A. With 28 restricted days, the loss being capitalized as before and subtracted from the figures previously found for the value, I should have for the total value of hydraulic and electric plant with eternally free water, based on the present load with 28 restricted days, \$127,700, or, at 50 per cent. increased load, \$155,617. Of course for the total value of the plant, Foster's valuation of the steam plant should be added in on those hypotheses, as I have already indicated.

Q. Have you prepared a summary of the values for reference? A. I have, Schedule S.

Mr. GREEN. I should like for reference to have that put in; it is simply a summary.

Mr. BROOKS. We have no copy of Schedule M, Mr. Green.

The WITNESS. That is not put in.

Mr. GREEN. That has not been put in evidence. It is nothing but a summarization of values given by Mr. Foster and somebody else, and is not used and is not the basis of any computation.

(Schedule S was marked "Exhibit 194, F. H. B.," and is printed on page 365 of this volume.)

Q. I asked you yesterday in regard to the depreciation of this plant. At what rate, expressed in percentage, if you can, per annum since January 1, 1898, do you think this plant is depreciating?

Mr. BROOKS. Wait a minute. I object to it.

The CHAIRMAN. That is on the question of present valuation?

Mr. GREEN. Yes, sir.

The CHAIRMAN. We think he can express his opinion as to any depreciation.

Mr. BROOKS. I would like to suggest, may it please your Honor, that he was never at this plant until last December.

How can he know what its condition was January 1, 1898, so as to express an opinion as to how much it had depreciated in the next two years?

The CHAIRMAN. Well, Mr. Green, what do you say to that?

Mr. GREEN. I do not understand that our brothers have claimed there have been any changes in the mechanism or things of that sort. The machinery is there. He is familiar with machinery of this type and this class, and he sees the condition as it was when he was there. I see no difficulty in his expressing his opinion of the general depreciation annually of the plant. It is based not alone on the wear and tear of the plant; it is based largely on advances in the art.

The CHAIRMAN. You can ask him what he considered the value of the plant was and what the depreciation was when he examined it.

Mr. GREEN. I should like, without arguing this at any great length, to have the witness express an opinion as to the value of the depreciation in per cent. per annum. He sees the buildings, he sees the type of the machinery, he knows the date of its installation—that has been testified to in this case, when the plant was built; and I think he is competent to state at what rate such plants depreciate, the machinery having been kept in fairly good condition.

The CHAIRMAN. If you will ask the witness the question whether there is in his opinion a certain rate of depreciation of certain buildings, and so forth and so on, and what that rate is.

Mr. GREEN. Oh, I will do that.

Q. Do you consider, Dr. Bell, that there is a rate,—a certain annual rate in machinery, buildings, and pole line of the kind and type that you saw at Holyoke? A. Yes, sir, there is undoubtedly a depreciation which can be expressed as an annual rate at this particular time—of course approximately.

Q. Will you state what, in your opinion, that is? A. Of course—

Mr. BROOKS. Well,— All right, go on.

Q. Just give your opinion. A. Of course it is not alto-

gether easy to fix on a rate which shall be right at this particular time without reference to previous rates of depreciation which may have been encountered; but from the character of the plant and from its age, I should say at the present time the value of the plant was going down somewhere about at the rate of 8 or 10 per cent. a year. In other words, it is depreciating now faster than it would have depreciated four or five years ago if it follows the general rule.

Q. That depreciation is owing largely to what? A. It goes largely to the fact that the art has been changing fast.

By Mr. GOULDING.

Q. What is that? A. It goes largely to the fact that the art has been changing rapidly.

By Mr. GREEN.

Q. And that 8 or 10 per cent. per annum is on the basis of the value in January, 1898? A. Roughly, yes. That, of course, is merely an estimate of it. You cannot pin down the depreciation at any particular epoch to any absolute figure.

Q. Is that your best judgment? A. That is my best judgment of it, yes.

Q. You stated earlier in your testimony, doctor, that owing to the advance of the art and changes in the way of doing business there had been a depreciation in the buildings. Take, for instance, the engine house; could that be expressed in a percentage of its cost, in your opinion?

Mr. BROOKS. He can answer that yes or no, I suppose.

A. I think so.

Q. What is that?

Mr. BROOKS. I object to it.

The CHAIRMAN. Why cannot he testify as an expert as to the percentage of depreciation? That has been done from the start in this case, practically.

Mr. BROOKS. Hardly from this remote standpoint, may it please your Honor.

The CHAIRMAN. I do not understand you, Mr. Brooks; I do not understand what the trouble is.

Mr. BROOKS. Why, how can he express an opinion of

what percentage of depreciation due to age and wear and tear there has been in this plant?

Mr. GREEN. He does not say to wear and tear.

Mr. BROOKS. Certainly; it is included in his rate of depreciation.

Mr. GREEN. I asked him for his depreciation for the advance in the science and art.

Mr. BROOKS. I have not heard that.

Mr. GREEN. Mr. Stenographer, will you read my question, please, and see if I am in error?

Mr. BROOKS. Perhaps you said it. If you did, it escaped me.

(The question was read.)

Mr. BROOKS. I object to that. If it is confined to advancement in the art I shall not object, but changes in the way of doing business I do not understand.

Mr. COTTER. Why not put the question in that form, Mr. Green? Otherwise we are left in doubt how much may be attributed to the change in the art and how much to other means.

Mr. GREEN. Change in the art covers both. I will leave out the second. Strike that out and put it "change in the art." Where I said engine house, I take in the buildings,—the engine house, the boiler room, and the electric buildings.

A. The depreciation or change in value due to change in the art I can only estimate roughly on the basis of how much too large, how much too great in original capacity, those buildings are as considered in the light of the modern art.

Q. January, 1898? A. January, 1898. And in my judgment, for the purposes of an electric light station those buildings are about double, broadly, about double the size that there would have been any need for on the 1st of January, 1898; and consequently I should say that from the change in the art the present buildings are not worth any more than suitable buildings of proper size for the art of Jan. 1, 1898, would be worth, to wit, about half what they are now. In other words, I think owing to the change in the art they are only about half as valuable for the purposes of an electric light station now as they originally were.

Q. Then they have depreciated what per cent.? A. They have depreciated half; 50 per cent.

Mr. GOULDING. I did not hear his answer. He said they are worth half what they were in January, 1898?

Mr. GREEN. No, he said in January, 1898, they were worth half their cost.

The WITNESS. They were worth half their cost Jan. 1, 1898.

By Mr. GOULDING.

Q. In January, 1898? A. Yes.

Q. I thought you talked about depreciation since? A. No, sir.

Mr. GREEN. You may inquire, Mr. Brooks. I may have forgotten something; if I have, you will deal leniently with me.

Cross examination by Mr. BROOKS.

Q. I understand you, Dr. Bell, to depreciate the buildings of this plant 50 per cent. because, in your opinion, they are twice too large? A. Yes, sir, twice too large, owing to change in the art.

Q. And you determined their size and your various valuations of this plant by the construction of a so-called new, modern, or ideal plant somewhere else? A. Well, I could hardly — could hardly say that.

Q. Well, when you get the size of the buildings, don't you get it by comparison with a new, modern, or ideal plant? A. Yes, but not with any particular plant put up at any particular place.

Q. No, I say — A. Simply the machinery, in comparison with modern practice, yes, sir.

Q. You would take the properties that you find there, the erections that you find there, and you compare them with erections that you would have elsewhere? A. Or that would be found elsewhere in plants of date about the 1st of January, 1898.

Q. Did you ever know of an electric lighting concern or any other manufacturing concern that depreciated its buildings because they were too large? A. I never knew any —

Q. You can answer that yes or no. A. Well, hardly yes or no. I never knew any plant to —

Mr. BROOKS. Why, may it please your Honors —

The CHAIRMAN. It seems —

The WITNESS. I should hardly say that I could answer that yes or no without conveying a false impression, may it please your Honors, which I would try to avoid.

The CHAIRMAN. You can explain yourself after answering. He asks you —

Mr. BROOKS. Certainly, I want to get a definite answer. I do not propose to shut out any explanation.

Q. Did you ever know of any concern that depreciated its buildings solely because they were too large for the manufacturing industry that was carried on therein? A. I cannot now think of any concern that so depreciated its buildings; intentionally, at least.

Q. What was that last? A. Intentionally, at least, openly, outspokenly.

Q. Did you ever know of any depreciation made by any concern, intentionally or unintentionally, upon its buildings because they were too large? A. Not upon its own buildings, certainly.

The CHAIRMAN. You will have to speak a little louder, doctor.

Mr. GREEN. You said you would allow him to explain, Mr. Brooks.

Mr. BROOKS. Yes. I do not quite see why there should be any explanation.

The CHAIRMAN. If he desires to, let him do it.

The WITNESS. The only explanation I have to offer is that I am not aware that any concern has charged off or depreciated its own buildings in any such way as Mr. Brooks has indicated. Whatever their value may have been, I do not know that they have ever charged off or depreciated.

The CHAIRMAN. The question here, doctor, is this: whether you ever knew of any business people depreciating the value of their property — buildings — because they were too large? Now certainly I could answer that yes or I could answer it no, and I do not see any reason why you could not.

The WITNESS. No, I do not know of any concern so depreciating its property.

The CHAIRMAN. That is all the question.

Q. Have you ever known, in all your experience, of any concern that has removed, torn down its buildings because they were too large, and erected smaller ones in their stead?

A. Yes; I have known of buildings being changed on account of their being unnecessarily large.

Q. I am not asking that question. I am asking this question: Whether or not you have ever known, in all your experience, any manufacturing corporation tearing down its buildings because they were too large for the business that was carried on therein, and erecting new ones, smaller ones, in their stead?

A. Not solely on account of their being too large,—no, sir.

Q. When you can answer me yes and no, be kind enough to do it. A. I will try to.

Q. And you shall have every courtesy in the way of explanation that is required or necessary. A. I will try to do so.

Q. Did you consider whether or not, in the present plant of the Holyoke Water Power Company, in the second story of the building, a business could be carried on which would require the transmission of power? A. I did not consider that such a business could be carried on there.

Q. Did you take it into consideration at all, the question whether or not a business could be carried on in the unoccupied space, say in the second story? A. No, sir.

Q. That would use power? A. No; not at all.

Q. If you found that the business of this concern could be conducted in smaller space, and that the unoccupied space could be rented advantageously to a business using power, would that affect your valuation of these buildings? A. Not for the purposes of the electric light plant.

Q. I am not asking you that. I will ask you this question: Supposing you were the owner of this property yourself, and you were conducting an electric lighting business, and you had all the unoccupied space that you say exists there, wouldn't you hunt around for a customer to occupy some of that space, and sell him power, if you could? A. I should certainly try to; yes, sir.

Q. Well, if you found him, and he was an advantageous customer, do you say that wouldn't affect your valuation of these buildings, if you owned them yourself? A. Not for the purposes of an electric light plant. I might utilize the space as a real estate investment, if you please, very profitably, but for the purpose of producing electric light I shouldn't consider it made any difference.

Q. That is, you mean to say that you haven't varied a hair's breadth in your valuation that you have rendered in this case from a consideration only of their use for an electric light plant? A. I have tried to adhere substantially to their valuation for use as an electric lighting power plant, and for nothing else.

Q. I want to run back with you a minute. Assuming that you were the owner of this plant, and you found an advantageous customer, to whom you could rent the unoccupied space, and sell or rent four or five of the mill powers advantageously, that you didn't need in the electric lighting business, wouldn't it, when you come right down to it, in your mind, enhance the value of the buildings very materially over the valuation you have given in this case? A. It would if —

Q. Just answer that, yes or no. A. I couldn't answer that yes or no, Mr. Brooks, without conveying an impression which I feel would be false. It would —

Q. Never mind, if you won't answer me yes or no. Let it go. A. That involves two questions, Mr. Brooks, and I can't answer it by yes or no.

Q. No, no matter. I don't withdraw it. Let it stand unanswered. We have got the answer. If you were a would-be purchaser of this plant, wouldn't that fact be one of the considerations that you would take into account when you came to put your valuation upon the plant as a purchaser? A. Excuse me. By that do you mean the probability of being able to profitably rent a portion of it?

Q. Yes, that is all right; and to somebody that would profitably pay you for the power transmitted to the unoccupied space that they used. A. It might affect my valuation.

Q. It would, wouldn't it? It wouldn't be a question of

might, would it? Wouldn't it affect your valuation? A. It would affect my valuation of the business, but you don't apply it —

Q. I am putting you this question. If you were a would-be purchaser, thinking of purchasing that plant, wouldn't the question of the probability or possibility of your renting the unoccupied space, together with some of the surplus power, to somebody else, affect your mental valuation of the property?

A. It would affect my mental valuation of the business, but not of the physical plant, I think.

By the CHAIRMAN.

Q. Why not?

Mr. BROOKS. That is what I want to know.

The WITNESS. Simply this: That if I knew that I could sell or rent a certain part of the buildings now unoccupied to a profitable customer, it would undoubtedly affect the valuation of the total investment I could make; but it wouldn't increase the valuation of the plant for the purposes of an electric light station.

By Mr. BROOKS.

Q. I haven't asked you any such question, have I? A. As to the total valuation of the property, the presence of such a customer probably would make a difference in my valuation.

Q. Would it affect your valuation of the land? A. I hardly know how to answer that question. Do I understand the land and the power, or the land as land, by that, Mr. Brooks? I would be glad to answer it.

Q. If you were thinking of purchasing this property, wouldn't the fact that you could rent the unoccupied space advantageously, and rent the power that wasn't required for electric lighting advantageously, affect your valuation very materially of the land and the property? A. I should think it would affect the valuation somewhat; yes, sir.

Q. Well, all right. Just the same as if you were going to go out here on Washington Street for the purpose of purchasing a property that was offered for sale, the question as to whether or not that property could be profitably rented would enter very materially into your consideration of its value,

wouldn't it? A. In making such an investment I should say that it would; yes, sir.

Q. Now, you spoke of the change in the art, whatever you mean, that it has been an element of depreciation, in your opinion? A. Yes, sir.

Q. If I am correct. Well, now, the change in the art don't affect the product that a machine gives out, does it? The machine remains the same, and, everything else being equal, its product continues the same? Is that right? A. If the machine has not physically deteriorated the product is the same.

Q. Take this case, only confining it to the change in the art. The change in the art doesn't affect the product of the machine? A. It affects the value of the product, but not the product itself.

Q. Just stay with me for a moment, if you please. A. It doesn't affect the product physically; no, sir.

Q. Then the change in the art means simply this,—that you have in your mind another machine of later invention that will give more product? A. That will give more product, or better product, or be otherwise more advantageous.

Q. What? A. A machine that will give more product, or better product, or be otherwise more advantageous.

Q. It amounts to this, doesn't it, that it gives more product, it comes down to that? A. No; it doesn't come down to that.

Q. Then take electric lighting mechanism. The change in the art doesn't mean in your consideration of depreciation that more product can be obtained from other machines? A. It may or may not mean that, but it doesn't necessarily mean that more product can be obtained.

Q. How is it in this particular case? A. In this particular case I should say that somewhat more product could be obtained from other machines.

Q. How much more? Have you calculated? A. The difference in product would involve two things: whatever difference in the efficiency of the machines there might be, and whatever difference there might be between direct-connected and direct belting on the machines. It involves two things.

Q. What per cent. more of product would you get from the

machines that you would have in your model ideal plant than could be obtained from these machines in this electric lighting station of the Holyoke Water Power Company? A. I should say that for a given indicated horse power I could obtain 10 per cent. more in the modern plant.

Q. With expenditures the same? A. With expenditures considerably less.

Q. You have calculated that, have you? A. Oh, no. You simply asked me the question. That is my best judgment at this moment.

Q. Then you would say, in your opinion, from mechanisms alone, that you have in mind to put in your ideal plant, you would obtain a 10 per cent. greater product than what the machines that are in this electrical station are capable of producing? A. From the mechanisms, including all the shafting and mechanisms up to and including generators, yes, sir; not in the generators alone.

Q. I think of this question. Supposing you have this plant up on Jones's tract, by the bank of the river, two miles away, more or less,—your ideal plant, I mean,—and you put in your ideal machinery, and you have your ideal help to run it, and have everything just as you want it, and assume that the present plant is making net earnings of \$23,000 per annum. How much, in your opinion, would you increase those net earnings by your new modern ideal construction? A. I am unable to stultify myself by that assumption.

Q. How much would you save this Holyoke Water Power Company if they do as you told them, and allow you to build the plant, and install in it the most ideal machinery, with all the most ideal accoutrements, how much would you save the Holyoke Water Power Company?

Mr. GREEN. I would like to ask what is meant by the most ideal machinery, the most ideal help, and so forth?

The CHAIRMAN. Assuming what you presented in your modern plant.

Mr. GREEN. What we presented was a practical working plant.

Mr. BROOKS. We are putting in the best. The question involves the best.

The WITNESS. I should save to —

Q. How much? I don't care about the details of it just now. How much? A. I should have to stop and calculate that. You will find that in the schedules, I think, somewhere.

Q. Well, stop and calculate it. Give me your calculation, or your approximation, just as you please.

The CHAIRMAN. He was about to give you the approximation.

The WITNESS. Well, I should say it would amount to something like \$15,000 or \$16,000 a year. That is simply a snap judgment of it.

Q. That is, then, if the net earnings are \$23,000 at the present time, you, by your ideal construction, would increase those net earnings to something like \$40,000, in your opinion?

A. That involves again the question of the present net earnings. I think that —

Q. Take that assumption. A. I think that the total running expense of a —

Q. Excuse me a minute. Just answer my question, doctor, and I will give you an opportunity to explain. A. All right, sir.

Q. If the net earnings are \$23,000 at the present time, you, by your ideal construction, would increase those net earnings to something like \$40,000 in your opinion? A. Assuming the correctness —

Q. Assuming that is as I put it. A. Assuming the earnings were in the present plant what you give us, the net earnings, I should expect the new and modern plant to increase them by the amount which you indicate.

Q. That is, you would make the net earnings, upon my assumption, \$40,000, substantially? A. Somewhere about that; perhaps a little less.

Q. And they might be more? A. Possibly. I think that you put it liberally, Mr. Brooks.

Q. What? A. I think you put it liberally. That is all right. It is near enough.

Mr. GREEN. He said \$15,000 or \$16,000, and you call it \$40,000 added to \$23,000.

Mr. BROOKS. The doctor didn't anchor himself to any particular sum.

Q. In any of your valuations that appear in these numerous schedules have you considered the gross or the net earnings of this plant? A. No, sir.

Q. Doctor, you have been called on, as I understood from your direct testimony, to make an examination for purposes of valuation of electric lighting properties heretofore? A. Yes, sir; on a number of occasions.

Q. What is that? A. On a number of occasions; yes, sir.

Q. Where? A. I have been called on for that purpose at Dubuque, Iowa, Sacramento, California, and Los Angeles, California, and also at several places nearer home.

Q. Yes. A. One or two of them I don't care to mention on account of relations with the backers.

Q. Did you make personal examination for purposes of valuation? A. Yes, sir.

Q. For the purchaser or for the seller? A. For the prospective purchaser, or backer of the enterprise. Sometimes one, and sometimes the other.

Q. Doctor, in those cases where you were called upon by the would-be purchaser or would-be seller to express an opinion upon the valuation of the property, of the whole properties, of the would-be investment, as it were, did you make it entirely along the lines of the valuations that you have testified to in this case?

Mr. GREEN. I object to that question on the ground that there are two statements in it, one of the property and another of the would-be investment, an entirely different thing.

The WITNESS. I think I can answer that, if you will give me the question.

(Question read by the stenographer.)

The WITNESS. No, sir; because in that case—

Q. All right. That is all I am asking you. I will give you an opportunity. A. In your own time.

Q. I think my next question will cover it, perhaps. That is, you considered the present earning capacity of the various plants that you were called upon to express an opinion of valu-

ation on, by either the would-be seller or the would-be purchaser? A. Yes, sir; I took that into consideration.

Q. That was the main factor of consideration, wasn't it?

A. No, sir; not the main factor, but an important one.

Q. That and the present opportunities for future business were strong factors, weren't they? A. Both of those entered, of course, into my valuations, because—

Q. I want to know whether it was a weak or a stout factor?

A. Sometimes a very strong factor, and sometimes not very strong,—depending on the plant, Mr. Brooks, in some places.

Q. You considered, did you not, when you were called upon to value a plant for either the seller or the purchaser,—the would-be seller or the would-be purchaser,—that the question of the present earnings and the present capacity for future earnings were very strong factors in the opinion of valuation that you would express? A. Sometimes they were very strong factors, and at other times not so strong. Generally I considered them important factors.

Q. They are extremely important, aren't they? A. Not always. Other things enter sometimes; but those are things which I always considered in the investigations which I have referred to.

Q. That is, you never made a valuation of an electric lighting property that you didn't take into consideration the present earnings and the present capacity for future earnings? A. No, sir; I have always taken those into consideration in the investigations to which you have referred.

Q. Doctor, when you have been called upon by the seller of electric lighting property, or by the would-be purchaser of an electric lighting property, have you made to your client a report of your opinion of the valuation, based upon the lines of the valuation laid down by you in this particular case? A. The—

Q. Now answer that yes or no. A. I can't quite answer that by yes or no; but I can answer it substantially yes or no, I think.

Q. I would like to know, if you can. A. I can't answer that yes or no; but I will answer it substantially as nearly as I can, if you want me to.

Q. Well, all right. A. In making reports to clients on the value of such properties, I have, so far as I remember, in all previous cases, taken into consideration the present earnings or the probable future earnings; and I have also taken into account the factors which have entered into consideration in this case. Sometimes the present and future earnings were a very large factor in the valuation, and sometimes that factor was comparatively reduced by the presence of heavy depreciation or unsuitability or other things. But those things always entered into my valuation of the business.

Q. When you have been called upon by a client to value a property that was paying a good income at present upon the investment, with a very favorable outlook for future business, did you put your valuations to your customers based upon the comparison of the then existing plant with one that could be built somewhere else? A. Sometimes; yes, sir. But always with reference to this,—to the possible or future business. Sometimes I had to consider a change in the physical plant, or a new plant. Sometimes I did not.

Q. What I am getting at is this. Did you ever, when called upon by the seller of the plant to value his property, he desiring to sell, having a good present income and good prospects of extended future business, did you ever fix your valuation by comparing the then existing plant with one that could be built by you somewhere else? A. I am not aware that I ever valued a plant, an electric plant, in actual existence, a going concern, for the seller. My relations happen to have been, I think exclusively, on the side of the buyers, as adviser for the General Electric Company and clients. I happen to have been on that side as regards the valuation of the plant in every case.

Q. Now, supposing that I owned a plant,—of course it is a condition that couldn't exist in the present state of my finances,—but supposing I owned this plant, and came to you and I said, "Doctor, I want to buy that plant, if I can get it at a fair valuation, and I want you to go and see what I can afford to pay for that plant, and report to me." And suppose you found that the plant was earning, net, \$23,000 per annum, and with a fair present prospect for very much enlarged future business. Would

you take into consideration, under those circumstances, the present earning capacity of the plant, the present earnings and the present capacity for future earnings, when you placed a valuation upon it at my request? A. I certainly should. Yes, sir.

Q. Wouldn't those be the main factors that you would consider, employed by me, as a person desiring to invest? A. They would be, I think, somewhat larger than the other factors.

Q. Wouldn't they be the main factors? A. They wouldn't overshadow the others, by any means.

Q. I am not asking that. A. But they would be a very important factor in it, undoubtedly, Mr. Brooks.

Q. And wouldn't you, under those circumstances, advise me that I could pay a good deal more than the valuation that you have given in this case?

Mr. GREEN. What for? Wait a moment. I object. I don't want to interrupt, but it seems to me that the witness has a right to understand the question.

The WITNESS. That has been put by Mr. Brooks.

Mr. BROOKS. I think we are getting along all right. The witness seems to understand me.

The WITNESS. I think I understand; but, to make it clear,—

Mr. COTTER. Let the stenographer read the question.

(Question read.)

The WITNESS. Assuming that—

Q. You can answer that by yes or no.

Mr. GREEN. Just a moment. I have a right to object and to be heard. I won't take very much time. The question has assumed that the plant earns a certain amount of money. Now that assumption must carry an entirely different meaning of the word *plant* than some other meaning.

Mr. COTTER. In cross examination, if the witness understands the question, it is all right. If he doesn't understand it, he will so state. We don't understand that he makes any complaint. Let the question be read.

(Question read by stenographer.)

The WITNESS. May it please your Honor, shall I give my understanding of the question?

Q. Do you say that you do not understand it? A. I think I understand it, Mr. Brooks; and I certainly want to put my understanding of it on record. According to my best intelligence, my understanding of the question is that you assume me to be advising you about the purchase of this concern as a business and a business investment. And, under those circumstances, I should certainly put upon the plant and the business a higher valuation than I have now, on your assumption that \$23,000 a year profits be correct.

Q. I will put my question once more. If I told you I wanted to invest in an electric lighting plant, and that I wanted to invest in this special plant, and you found the earnings were \$23,000 per annum net, and that the present opportunities for future business were good, wouldn't you advise me to pay more than the valuation that you have given in this case? A. For the reasons expressed in my last answer, yes.

Q. I submit that that may be answered yes or no. A. For the reasons expressed in my last answer, yes.

Q. I don't ask you for reasons. I ask for a direct answer to the question.

The CHAIRMAN. You are not asked for reasons. You are asked for a direct answer.

The WITNESS. Under those circumstances, Mr. Commissioner, before — I beg leave to ask whether he means, in buying that plant, he is to buy the plant as a business, and a business investment, or simply —

Mr. GOULDING. I submit that the witness exhibits none too much candor, and he exhibits no candor when we ask him if he wouldn't put a greater valuation upon the plant, and he brings in this argument.

The WITNESS. The question is not candid, Mr. Goulding.

Mr. GOULDING. You are not candid, sir, and I object.

The WITNESS. I have been candid, but the question itself is not candid.

The CHAIRMAN. The question is to be answered yes or no.

Mr. GOULDING. I submit that we have had enough of the evasion of this witness.

Mr. GREEN. I think it is hardly fair to make such statements to the witness.

The CHAIRMAN. The question is to be answered. What is the question?

(Question read by stenographer.)

The WITNESS. I should think that I would advise you to pay somewhat more than the valuation that I have given. I haven't figured how much.

Q. Wouldn't it be a good deal more? A. It would certainly be some. I should have to figure it out.

Q. Give me your opinion about it; if you want to change it hereafter — A. Roughly, I should think —

Q. Say, a good deal, wouldn't it?

The CHAIRMAN. Let the witness answer.

Mr. BROOKS. Well, I am not calling for a certain sum.

The WITNESS. I should say a third to a half more, roughly; possibly even a little more than that; just how much I couldn't tell without an investigation.

Q. You have not given any attention to the present opportunities of future business there? A. What, sir?

Q. You have not considered the present opportunities for future business at this plant in any of your calculations? A. No, sir, I have not.

Q. You did not consider in any of your valuations the structures that were there, in obtaining your structural value? A. No.

Q. And you would be unable, if I tried with you, to go into any of the construction that is there? A. Of the structural values and so on?

Q. Yes. A. I probably should be, without making investigations.

Q. And I comprehend in my question all the structures, buildings, water plant, plants, etc. A. I should hesitate to give a detailed — a valuation on those on my present knowledge.

Q. You have not made any details? A. I have not made any.

Q. And you have not considered them in your consideration, as I understood you yesterday, except a cursory examina-

tion? A. I have given some consideration in my schedules through the valuations of others.

Q. That is what I mean. You have given, then, a valuation by a comparison only with the ideal plant? A. I valued by comparison with the new and modern plant.

Q. And that is your only method of valuation in this case? A. Save —

Q. It is true, isn't it? A. I think so. I thought I made one schedule that may have gone further, I don't know.

Q. Now, what water power plants did you have superintendence of? A. Redlands, California.

Q. I mean in person. A. That is in person. Portland, Me.; in part, Sacramento, Cal.; Traverse City, Mich., and Dowagiac, Mich.; and I have superintended those either in whole or in part.

Q. Were you there in person? A. There in person, yes, sir.

Q. Take it at Portland, Me.; how much time were you there? A. Portland plant? I was there pretty nearly every week for a year.

Q. Well, did you install — do you say that you installed the plant? A. I took up the installation —

Q. This is a hydraulic plant? A. This is a hydraulic plant. I was not personally responsible for it as contractor, but I was responsible for it as consulting engineer, for the plans, etc., and I superintended the general construction of the plant as a whole.

Q. Did you plan the plant? A. Did I?

Q. Did you plan the hydraulic plants that you have mentioned? A. Those at Redlands and Sacramento and Dowagiac and Portland, Me., I planned in part; that is to say, I took up the arrangement of them, in one case after the dam was built, and in another case prior to that.

Q. I will put this question. Did you ever plan the entire water plant and the installation which was afterwards put in in accordance with your plans? A. I think I may say that I designed the Redlands plant in that way.

Q. That is, the entire plant? A. Substantially the entire plant.

Q. And that is the only one that you recall? A. In part—

Q. Answer my question. A. Yes. Well, the recent plant at Portland, Me.; there have been two plants there.

Q. You say that recently, at Portland, Me.? A. Yes.

Q. You have planned the entire water plant which was afterwards installed? A. Substantially.

Q. What is the water development there? A. As to the water development there, I should say there was a small original plant.

Q. I am asking now about this last plant? A. The water development there, the installation, was a direct-connected plant of 750 kilowatts capacity, with penstocks, water wheels, etc., connected to a somewhat improved and enlarged dam.

Q. What was your Redlands plant? A. The Redlands plant was a plant of about 600 kilowatts capacity, with a long pipe line.

Q. How much would that be a mill power? A. Oh, 15 to 18; fully 15 to 18.

Q. And your Portland, Me., plant? A. A little over 1,000 horse power.

Q. This last one? A. This last one, 750 kilowatts units. I should say that I did not personally direct every detail of the thing, but the thing was done directly under my direction as consulting engineer, and I superintended it in a very large measure.

Q. Where have you determined the amount of water power that a stream would give out or develop? A. In a number of instances in California.

Q. Where water power plants were afterwards installed? A. Yes, sir.

Q. Have you made a test of a water wheel such as the one in common use and practice by hydraulic engineers? A. I have made several—

Q. You know what I mean by that? A. I don't exactly know just what your question implies, but I think I understand.

Q. Is there a test, well known for water wheels to the pro-

fession of hydraulic engineers? A. A test of efficiency I suppose you mean.

Q. Yes. A. Yes.

Q. Have you yourself ever made such a test? A. I have.

Q. What was the test? A. On running plants.

Q. Oh. What was the test, and of what did it consist?

A. The test was taking the efficiency of the wheels from the known flow of water and from the output as measured on the electrical machines, the same being of known efficiency.

Q. How did you obtain the flow of water? A. The flow of water in these cases was obtained by weir measures or their equivalent.

Q. Did you make them? Did you obtain them? A. I had obtained them at various times. I was at the plant in each case and reading the electrical instruments.

Q. Is this test that you say you have made the one that is recognized as a test by the hydraulic engineers? A. It is recognized as a common test of plants.

Q. Did you ever test a plant by a testing flume? A. No, sir.

Q. Or seen one tested? A. No. I have only known of one.

Q. I didn't ask you that. A. It is obvious, unless I was there.

Q. You did not? A. No, certainly. I have only tested wheels *in situ* in the plants.

Q. That is, you assumed the efficiency of the wheel in your test? A. No.

Q. What? A. No.

Q. Well, how did you obtain the efficiency of the wheel? A. By finding out how much power it developed under a given head and flow of water.

Q. How did you find it out? A. By the electrical measurements made.

Q. And then you assumed the efficiency of the electrical generator? A. No; I knew the efficiency of the electrical generator from shop tests.

Q. Did you make the test of the electrical generators? A. In some cases I did, in others by assistants. In at least one of them I did. In the other case it was made by my assistants.

Q. But you never made the test of the water wheel except in connection with electrical machinery? A. No, sir.

Q. Now, doctor, is it a fact or not that the engineers' estimates of cost are most always exceeded by the result?

Mr. GREEN. I object.

The CHAIRMAN. We will admit it, as far as the witness knows.

The WITNESS. I don't know whether that is to be considered as a general rule or not, Mr. Brooks. Sometimes they go over, sometimes they go under.

Q. So far as your experience goes, isn't it the usual thing? A. I should say about half and half. I should say sometimes they go over and sometimes they go under; depends on how conservative the estimates are.

Q. As I understand you, your connection with steam plants has been mostly with auxiliary steam plants? A. Largely, yes, sir.

Q. Auxiliary steam plants in electrical manufacturing or producing concerns? A. Auxiliary steam plants as adjuncts to hydraulic plants.

Q. Have you in active practice, in manufacturing, made any test to determine the efficiency of the engines? A. Shop tests and outside.

Q. I mean other than in manufacturing? A. Yes, sir.

Q. Day after day, month after month, so as to determine the efficiency for a long period of time? A. Not for long periods. I made plenty of ordinary tests.

Q. In order to find out every-day conditions it is really necessary, isn't it, that the test should extend over a long period of time, while the engine is doing the business that it was bought to do? A. I don't think so, no, sir; that is to say, I think that there has been sufficient experience accumulated to enable one to make a very close judgment from a day or two's careful, conservative test. Of course, sometimes, the longer tests are available, and I like them when I can get them.

Q. Well, they are more or less reliable? A. They are very reliable.

Q. Showing every-day conditions? A. They would vary but little from short tests under careful management.

Q. You take a dress parade test and it don't give you every-day conditions, does it? A. No, but I endeavor never to get dress parade tests.

Q. I am asking you the question. A. If the test is a dress parade test it does not.

Q. Are you a steam engineer? A. Only to the extent that every consulting electrical engineer has to be, that is, to the extent of planning and handling and estimating on steam plants, buying and selling occasionally.

Q. Would you say, doctor, that you fairly consider yourself a steam engineer? A. I should say that I had had considerable experience in steam engineering.

Q. Are you an hydraulic engineer? A. I have had considerable experience in it, but I don't consider myself a professional hydraulic engineer.

Q. You do not? A. No, sir.

Q. Are you a mechanical engineer? A. To a considerable extent. I have often been called in mechanical engineering problems, but I consider myself especially an electrical engineer. I think I know something about the other.

Q. And you have had a large experience, you say, in electrical matters? A. Yes, sir.

Q. And you consider yourself an electrical engineer and not a hydraulic, mechanical, or steam engineer? A. Only in so far as to be an electrical engineer nowadays implies a considerable familiarity with those other branches of engineering. I could not be an effective electrical engineer if I did not know a good deal about the others, although I don't consider myself a professional hydraulic or steam or mechanical engineer except as I have stated.

Q. Can you tell me what the variation is in coal consumption of a steam plant when the load varies so that the mechanism is from 14 to 15 times the minimum load, as in this particular plant, where it runs from 40 horse power to 580 horse power a load? A. That would depend to a very considerable extent on the character of the plant. I can tell you within a —

Q. Take this plant. A. Take this plant?

Q. Yes, sir. A. I can give you an estimate on it. It would necessarily be rather rough, but I can give you according to my best judgment, if you like.

Q. I am asking you, as a result of your own experience in tests which you have made of coal consumption, whether or not you can tell me what the variation is in coal consumption between the maximum and the minimum load, of which I have already spoken in this present electrical plant. A. I have in a number of cases tested Corliss engines, which are simple, non-condensing Corliss engines, not dissimilar to these, and, based on that, I can give you an approximate estimate as to the difference in steam consumption, the coal consumption depending somewhat on the fireman.

Q. Well, as a result of your own experience and tests. A. I should say that the steam consumption —

Q. This is coal — I am asking about coal consumption.

A. Well, I shall have to assume then —

Q. Coal per horse power per hour. A. Oh, at extreme low loads it would probably be —

Q. I will assume here an evaporation of 10 lbs. of water to a pound of coal, simply for simplicity. I don't care so much about the process as the results; you get me right into the mazes then. A. I don't want —

Q. I want to find out, between the maximum and minimum load of which I have spoken, what the variation is in coal consumption per horse power hour, in your opinion, derived from your experience and as a result of coal consumption tests which you made yourself. A. As respects such engines as are in that Holyoke plant, I should say at the lightest loads the coal consumption would be between — well, would be about five pounds.

Q. Five pounds? A. Five pounds of coal per horse power hour.

Q. That is right? A. On the boiler efficiency which I have assumed. I don't know what the real efficiency of their boilers is. And that would run down to about two and a half pounds at the rated load of the engines. It might even go

above five pounds under certain conditions of practically only friction load.

Q. Considering the load as 40 horse power at the minimum and 580 at the maximum, you would say that a variation in coal consumption would be between what figures per horse power hour? A. Would be between possibly as high as six pounds per horse power hour at the lightest load to two and a half, or possibly a shade better than that, at the highest power. I would simply explain there that that is based on ten pounds evaporation of water from one pound of coal, and the measurements are mostly made on the steam consumption, but that is what they would be approximately under those conditions.

Q. Did you ever test an engine of this size? A. Yes.

Q. Of this make, to determine the coal consumption per horse power hour? A. I have so tested engines not of —

Q. Of this size engines and make? A. Of very nearly this size and of very similar make. I am not aware of ever testing at any time engines of the particular make of these Holyoke engines.

Q. Of very nearly this particular size? A. Of very nearly this particular size.

Q. This is not a Corliss engine? A. It is similar to the Corliss type engine.

Q. It is not the Corliss engine? A. No, not the regular Corliss engine.

Q. What is it? A. A Wheelock engine.

Q. Did you ever test the Wheelock engine? A. I don't think I ever did.

Q. Never did? A. No. But I have assumed in my answer that it is practically like the Corliss.

Q. Did you ever test a Wheelock engine to determine its efficiency? A. Never tested a Wheelock engine of any kind for any purpose except as I helped in that test down in Holyoke the other day.

Q. What did you have to do with that test? A. I principally kept watch on your experts, Mr. Brooks.

Q. Did you make any tests? A. I occasionally took a card, inspected a card.

Q. That is the usual way of testing? A. Yes. I read the gauges on the water wheel while Mr. Main was reading the dials.

Q. Is that the only test you made? A. That is all I personally did other than, as I say, looking after the general progress of the test, and trying to see that everything went smoothly.

Q. Did you calculate card results? A. I calculated water results, but no card results.

Q. Have you got the calculations of your water results here? A. No. As I say, I got the general result, but I simply took the same curve that Mr. Main used and checked up the results.

Q. Mr. Main made the calculations in both instances? A. No. I made the calculations in both instances.

Q. What do you mean by Mr. Main's results? A. I simply went through some of the figures to see whether my results and his would bear out, and they did; that is all.

Q. Mr. Main was on the one side, and who upon the other conducted the tests? A. Well, Mr. Main conducted the tests. I believe he gave some of his cards to Mr. Whitham.

Q. Did you in your calculation of water power—did you do anything but use Mr. Main's cards? A. I read the gauges during the water power tests, and then used the same cards that Mr. Main did.

Q. In getting your calculations you used the same cards? A. I used the same cards. I understood those to be copies of the larger ones, that is, they are the wheel curves which are in this case.

Q. Do you really consider that there is any material difference in efficiency in the direct-connected unit over the belted unit? A. There—

Q. Just answer that question. A. I have answered just as frankly as I can, and I want you to give me credit for it.

Q. I want you to answer whether you cannot. A. In this particular case I cannot.

Q. I want an answer, yes or no. (The question read.) A. Generally speaking, I think there is a small difference.

Q. What? A. Generally speaking, I think there is a small difference in favor of the direct-connected units.

Q. Well, is it large enough to be perceptible? A. Very often it is,—yes, sir.

Q. Do you really consider that there is any material difference in efficiency in actual operation, in actual production, between the direct-connected units and the belted units? A. I think that in very many cases there is, as I have stated, an advantage in the case of the direct-connected unit. That does not hold for all sizes and speeds at which comparisons may be made.

Q. Take it for electrical business? A. That is what I am referring to.

Q. You think, in some cases, it is in favor of direct-connected units? A. In most cases.

Q. Which is your choice, your personal choice? A. Personally, in dealing with a plant where I could use fairly good-sized units,—that is, units of a hundred or two hundred kilowatts,—I should prefer to use them direct-connected. I doubt very much whether, in the small units, there is any material advantage in the direct connection.

Q. Which do you use in this new and modern plant which you set up by comparison to obtain the valuation of the present plant? A. I used there—

Q. The belted? A. Belted units, on account of arc machines, which are small.

Q. You used the belted units for your new and modern plant, erected somewhere else, and that is what you used by comparison to obtain the value of this plant? A. As of Jan. 1, 1898.

Q. As of Jan. 1, 1898? A. Yes, sir.

Q. You chose for your modern plant the belted units? A. I chose for the modern plant the belted units, on account of the arc machines.

Q. And you put in a shafting in a modern plant? A. I put in some short shafting.

Q. That was your choice Jan. 1, 1898, wasn't it? A. For a plant containing units of this size, and for this service, yes.

Q. Then, for this plant, for which you would prefer belted units rather than direct connection — A. I don't think I would now.

Q. I mean as of Jan. 1, 1898? A. As of Jan. 1, 1898. I think I should have installed that plant very much according to my schedule.

Q. You preferred belted units to direct-connected units Jan. 1, 1898? A. I considered it was necessary to use them.

Q. Then it was necessary? A. It was necessary for certain reasons to use them.

Q. In January, 1898, what plants in New England had installed this Brush multi-circuit arc generator? A. The Boston Electric Light Co.

Q. Yes, that is all right. I hadn't finished my question. That you would install in your modern plant? A. The Boston Electric Light Co., I think.

Q. And they were the only ones to run them, and with them it was an experiment? A. I don't think it was an experiment with them at that time.

Q. You say it was not an experiment. A. I don't think it was an experiment. They had, I think, pretty well satisfied themselves that it was all right before Jan. 1, 1898. They were putting them in in the fall of that year, and have been putting them in continually since.

By Mr. GOULDING.

Q. When did they put them in, the fall of 1898? A. The fall of 1897.

By Mr. GREEN.

Q. That was the only concern that had them in use, so far as you know? A. I don't remember that. I don't know of any others.

Q. You know of no others, and your knowledge of electrical equipment throughout the United States is pretty good, you think, don't you? A. In some respects.

Q. Yes. I see that you have five ampere machines of 145 lamps each in your modern ideal plant. A. Yes, sir.

Q. Had those been devised Jan. 1, 1898? A. I think they had been.

Q. Are you willing to swear to it? A. I would not be willing to state absolutely that I knew of my own knowledge that they had been, but my impression is that those machines had been designed at that time.

Q. Were any of them in use Jan. 1, 1898? A. I don't think machines of that ampereage, the half arc machines, so called, were in use, actually running.

Q. Jan. 1, 1898? A. I don't know of any place where that particular ampereage was used.

Q. Had any of them been built on Jan. 1, 1898, and put upon the market, so far as you know? A. I think they had been built, but whether any of them were out I do not at this moment recollect.

Q. I want to ask you if one of them was built before the summer or fall of 1898? A. I don't know.

Q. What was the first concern that used them, to your knowledge? A. I know that some of the early machines —

Q. Answer the question. A. I don't know.

Q. To your knowledge? A. The first concern that I have in mind was at Springfield, but I don't know whether there were any prior to that or not.

Q. That is, the Springfield Electric Light Company? A. Yes, sir.

Q. Now is your ideal system of distribution, in your opinion, just as safe to the general public as the present system of distribution? A. I should say so, yes, sir.

Q. What? A. I should say so.

Q. What is the difference in voltage? The ideal, model, modern one is 10,000 volts, isn't it? A. Well, not 10,000 volts on the outside circuit, or anything like it.

Q. Under certain conditions it is 10,000 volts, isn't it? A. No, sir; that is, outside the station.

Q. What? A. Outside the station it is not 10,000 volts. The circuits are looped into the station. The whole voltage can only be obtained in the station.

Q. On a multi-arc machine isn't it 10,000 volts outside the station? A. What, sir?

Q. Isn't it 10,000 volts outside your station on your multi-

arc circuit machines? A. It would not be,—there would be no place on that distribution system where one could run foul of 10,000 volts, unless he got across the main terminals of the machine. The whole voltage —

Q. Supposing you came in contact with the system outside, wouldn't you get your 10,000 volts? A. I think not. I do not know any place on the system outside where you could get 10,000 volts.

Q. Have you considered that? A. Certainly, yes.

Q. You could get your 10,000 volts in the station? A. You could, if you tried hard, get 10,000 volts in the station.

Q. You would not have to try very hard to get it, would you? A. Well, you would want to keep away from the machine.

Q. What is the voltage of the present system? A. Of the present system? At Holyoke?

Q. Yes; 2,500 volts? A. The biggest voltage would be about 2,500 volts. Just what it is, I do not know, but a 50-light machine would give about 2,500 volts.

Q. I am requested to ask you if the maximum voltage at Holyoke is not 1,000? A. Well, I understand there are some 50-light arc machines, Mr. Brooks, and, if there are, the voltage would be over that.

Q. I do not think it is of any consequence. A. That is all.

Q. Are there more than one per cent. of the generators in use at the present time that have revolving fields? A. I should say that probably there were; I have never seen any figures on it. I do not know anybody that has made any.

Q. Made any what? A. I do not know anybody that has made any figures on it.

Q. Well, it is a very small percentage, isn't it, that are in use, even at the present time? A. Of machines recently installed, quite a fair number. Of the older machines, of course a few years ago there were none at all.

Q. How many were there Jan. 1, 1898, of these revolving field generators? A. Oh, a good many.

Q. What? A. A good many; I do not know just how many.

Q. How many in New England? A. I do not know; quite a number of them — revolving field.

Q. It was an extremely small per cent., wasn't it? A. Not an extremely small per cent., no, but there were quite a good number running at that time. They had been running for some years by some of the companies.

Q. Do you know what companies ran them Jan. 1, 1898, of your own personal knowledge? A. I think Pittsfield; I think I have seen them in Pittsfield.

Q. Jan. 1, 1898? A. Oh, prior to that, prior to that some time. I was not in Pittsfield at that time.

Q. Prior to Jan. 1, 1898, or up to that time? A. I certainly saw some in Pittsfield running.

Q. Anywhere else? A. I really do not remember. They had been often put out some years previous to that.

Q. What price do you pay for your land of your ideal plant? A. I was — I assumed —

Q. What price? A. I assumed five cents per foot at the request of counsel.

Q. Do you know anything about land valuations at Hol-yoke? A. I know absolutely nothing about them except as I have been requested to assume them by counsel.

Q. Did you take into consideration in any of your valuations that you would have to pay for either condensing or feed water? A. I assumed that the condensing water was obtainable at the cost of making connection to it; that is, obtainable practically from the river.

Q. Did you assume in any of your calculations that you would have to pay for your modern, new, ideal plant anything for feed or condensing water? A. Nothing more than what you would have to pay in order to make and keep up the connections to the river.

Q. Did you obtain any information as to what the rights of the Water Power Company were up and down the river? A. No, sir.

Q. Supposing you had to pay for your feed and condensing water, would your figures roost on a good deal higher branch? A. Not very much higher.

Q. Supposing you had to pay city rates for condensing water, it would mean, would it not, that your steam plant in your ideal concern would be prohibitive? A. No; because I should put in a cooling tower.

Q. Have you calculated how much that would cost? A. Yes, roughly.

Q. Did you ever build a water tower? A. I never did; I have got estimates on them.

Q. Have you ever engineered one? A. No.

Q. Have you ever planned one? A. Yes, I have.

Q. That was built? A. That was not built. I got estimates for it.

Q. Just stay with me. A. I will try to stay with you.

Q. Have you ever made any tests of water towers? A. I have seen many of them, but have not made them —

Q. Have you ever made any tests of water towers? A. I have seen many of them, but have not made any of them personally.

Q. Why can't you answer my question? A. I am answering it.

Q. I submit, with all courtesy to you and respect to the Commission, that you have not. A. I am trying to, Mr. Brooks.

Q. Why can't you answer me yes or no when there is an opportunity to answer it? A. Because sometimes answering yes or no gives too good an opportunity to garble the answer, Mr. Brooks.

Q. Oh, yes. You feel, by reason of your retainer, a great interest in your client's case, do you? A. No, sir, not any more than I should have as an engineer, but I object very much to having questions asked which are apparently asked for the purpose of misunderstanding. I do not like to mislead the Commission.

The CHAIRMAN. Mr. Witness, you are not called upon to reflect upon counsel any more than he is to reflect on you.

The WITNESS. I desire —

The CHAIRMAN. Just a moment. Put the next question.

Mr. GREEN. He put the question to the witness —

Mr. BROOKS. He opened it up.

The CHAIRMAN. You had better stop this discussion and go ahead.

Q. Doctor, if you will please mind. A. I will try to, Mr. Brooks; so do you.

Q. I will. Doctor, how many vertical water wheels are there in the city of Holyoke; what proportion of all the wheels in Holyoke? A. I think a very large proportion, Mr. Brooks.

Q. What proportion of all the water wheels in New England are vertical? A. I am simply making this as a guess.

Q. Is it a very large proportion? A. I should say half, for a guess. It is a pure guess, Mr. Brooks, nothing more.

Q. Are vertical water wheels being manufactured and sold upon the market now? A. Oh, I think so; yes.

Q. Yes? And the proportion of vertical water wheels in use is very much larger than the horizontal? A. I should somewhat doubt that. I cannot speak *ex cathedra* on that point.

Q. No? A. I should rather doubt it. For electrical —

Q. I want to ask you — A. Do you mean for the —

Q. —if water wheels are not manufactured now in the ratio of three to one for horizontal? A. I really do not know. I have no figures on that subject at all. I know they are not manufactured for electrical purposes in any such proportion.

Q. You have answered the question: let us quit. You have a jack shaft in your modern plant? A. Yes, a short jack shaft.

By the CHAIRMAN.

Q. What is a jack shaft, if I may be allowed to interject a question without being sat on too hard? A. The name jack shaft is usually applied to a comparatively short shafting to which belts from prime movers — that is, engines or water wheels — lead, and from which they are taken to other shafts or to various machines. It is used in contradistinction from a line shaft, as being a comparatively short intermediary shaft.

By Mr. BROOKS.

Q. It is a shaft from which you distribute power by belt?
A. Yes, sir.

Q. To the various other lines of shafting? A. To various other lines of shafting or to machines, yes, sir.

Q. You make a criticism on the dynamo floor there because on the dynamo floor as it is you could not get direct-connected units, as I understand. A. Well, you could not get direct-connected units, certainly with the dynamo floor as it is, in any easy way.

Q. That really does not amount to anything, does it, in your view of the situation that direct-connected units are impossible, or were Jan. 1, 1898? A. My criticism was directed more against the shafting than against that dynamo floor.

Q. Just stay with me on that. A. All right.

Q. Because I am taking up a piece of your testimony. A. All right. I should say it amounted to something, Mr. Brooks.

Q. No. I understood you that at Holyoke, Jan. 1, 1898, in your modern plant even, you could not have direct-connected units. A. I did not choose to have direct-connected units in that plant for certain reasons.

Q. I understood you to say that it was impossible Jan. 1, 1898, to have direct-connected units, and it was necessary to have belted units. A. I did not say that—

Q. As of Jan. 1, 1898, at Holyoke? A. I did not intend to say that it was in any sense impossible to have direct-connected units, but—

Q. Didn't you say that it was necessary to have belted units?

Mr. GREEN. Let him finish.

The WITNESS. I should have preferred, if I had been installing a new and modern plant at that time, to have used the belted units for the sake of using the arc machines.

Q. Then the criticism of the dynamo floor being too high for direct-connected units Jan. 1, 1898, is of no consequence, is it? A. It is of some consequence, yes.

Q. With reference to direct-connected units as of Jan. 1, 1898, in the Holyoke plant? A. I would have been very

glad to use direct-connected units if I could have there, but I do not think it is a very important matter concerning the direct-connected units alone.

Q. All right. How much do you depreciate the plant because you could not get the direct-connected units by reason of the dynamo floor being higher than in your opinion it ought to be? A. I do not think for that cause I depreciated it at all.

Q. How much do you depreciate this plant for age and use? A. That is, the whole —

Q. This whole entire plant from A to Z? A. I have made no figures on its depreciation from A to Z.

Q. Then you cannot tell? A. I could simply give you my judgment on it on the spur of the moment.

Q. Have you calculated, in any of your figures that have been put in here as depreciation, the amount of depreciation due to age and wear and tear? A. Not as separated from the general question of depreciation.

Q. No? Neither can you go over with me and tell me the various elements of depreciation in the various buildings, and how much for age and wear and tear — how much each would be? A. I should hesitate to do so unless I had examined the various details very carefully, Mr. Brooks. I simply depreciated the plant *en masse*, based on all the causes of depreciation.

Q. What concerns, electric light concerns, in New England have changed their mechanisms to the ideal that you have expressed in this case as of Jan. 1, 1898? A. I followed practically in a very similar line in the Portland plant to which I refer.

Q. Now let me see; do you catch my question? A. Perhaps not.

(Question read.)

A. A good many have changed them in part in that direction; I do not know —

Q. Up to Jan. 1, 1898? A. What, sir?

Q. Up to Jan. 1, 1898? A. The Boston Electric Light was changing, as I said, to those arc machines —

Q. On Jan. 1, 1898? A. They began changing before that, and they kept up changing, I think, pretty steadily.

Q. Was not that change made when the property of the Boston Electric Light Company was taken by some proceeding? A. I do not know whether it was made at that time or —

Q. At the time of the taking of land for the Southern Terminal Station? A. I do not remember when that was taken. I know the change was going on about that time.

Q. Up to Jan. 1, 1898, what concern in New England had changed its mechanisms in its electric lighting plant to conform to what you now consider to have been the ideal mechanisms for Jan. 1, 1898? A. I am hardly referring to those as ideal mechanisms. I rather object to that phrase, Mr. Brooks. I simply —

Q. Well, I will stick to it for a spell. A. All right.

Mr. GOULDING. (To witness.) Subject to your exception.

Mr. BROOKS. Yes, you may have your exception.

The WITNESS. There were a good many plants which had —

Q. Now let us stick to this — A. All right.

Q. — Jan. 1, 1898.

Mr. GREEN. I think he was trying to answer your question, if you would allow him.

The WITNESS. I am trying to make myself clear without unnecessary delay. I would say that there were a good many cases of plants which were changing in that direction, making approximations to that line of operations, prior to that.

Q. I ask you my question again: what plants up to and including Jan. 1, 1898, had changed the mechanisms that they had and installed your ideal or most modern mechanisms? A. Well, as regards the alternating end of it, there are quite a number of instances. Concord, N.H., dropped its direct current and put in modern alternators —

Q. When? A. Way back in 1893,— the fall of 1893,— under my direction.

Q. Yes. What concerns up to Jan. 1, 1898, changed their mechanisms to conform to your ideas? A. The same type of modern — not the same type, but a similar type of modern alternators had gone into —

Q. As I understand, I mean changed their mechanisms ; I do not mean original construction. Your Concord case was a case of original construction, wasn't it? A. No, because they had a prior plant.

Q. What became of it? A. I think they sold it, the old stuff in it, for about what they could get, Mr. Brooks.

Q. Wasn't there any water power development? A. There was a new water power developed, yes.

Q. Yes, and an increase in business and an increase in the size of the plant? A. There was an increase in the size of the plant, and the old system was dropped.

Q. Just answer my question. What concerns up to Jan. 1, 1898, had changed the mechanisms they had and installed in their place the ideal? A. What ideal?

Q. Your — same old ideal. A. I do not know that the plant actually, in every particular as I constitute it, has ever been installed anywhere or ever would be, for the simple reason that every plant has to stand on its own legs. But changes of that sort were being made by a number of plants along about that time, including the Hartford plant.

Q. I asked my question, and I want an answer to it. I am going to take it up with you again in just a minute. (To the stenographer.) Just repeat the question.

Mr. GREEN. I think the witness has answered that question.

Mr. BROOKS. I will take the ruling of the Commission on it.

The CHAIRMAN. I don't know. I don't remember the question.

(The question and answer were read.)

The CHAIRMAN. As far as I understand the question, I think he is trying to answer it.

Mr. BROOKS. I think you are right about that.

The CHAIRMAN. I think he has answered it. You can try it once more if you feel as though —

Mr. BROOKS. I am going to. I am simply endeavoring to rid myself of details, so I will take this up.

Q. Referring to your Schedule C, what concern in New

England, up to Jan. 1, 1898, threw out its open-air arc machines, and replaced them with Brush multi-circuit arc generators?

The CHAIRMAN. Now there you go right to the point.

A. I think the Boston Electric Light Company, as I say, was doing it about that time. They were certainly changing to the enclosed arc lamps, and whether the —

The CHAIRMAN. That was not the question. The answer is excluded.

The WITNESS. I beg your pardon.

The CHAIRMAN. Better stick to the question once.

Q. Well, you think the Boston Electric Light Company. What others in New England, up to and including Jan. 1, 1898, threw out their open-air arc machines, and put in this long-named machine of yours? A. I do not think—I do not remember any except the one to which I have referred.

Q. Well, you do not think there were any, do you? A. I do not know. I think there were, but I certainly do not remember them.

Q. I thought you just started to say, "I don't think there were any," didn't you? A. No.

Q. Do you recall any? A. I do not recall any.

Q. Well, we will stick to that. A. You can stick to that. I will leave it there.

Q. I am requested to courteously request of you that if before your examination closes you discover any such concern lurking about in New England, you will name it to us. A. I will endeavor to do so.

Q. What concern in New England up to Jan. 1, 1898, took out Edison direct-current generators, and installed in their stead revolving field multi-phase generators? A. It is my impression that the Pittsfield Electric Light Company did. I know that they had the revolving field multi-phase generators, and I think they fired out some direct-current machines, but I am not sure.

Q. Well, with the exception of the Pittsfield Company, of which you are not sure, is there any other that you know of that fired out the one and fired in the other? A. I am very sure that there were several of the others put in, but whether

any of them replaced Edison three-wire generators I do not really remember.

Q. Just stay with my question. A. I really do not know, Mr. Brooks, whether —

Q. You do not know of any others, do you? A. I do not know whether there were any others or not; my impression is that there might have been, but I do not know.

Q. If you find any others, bring them in. A. I will do so with pleasure.

Q. What concern up to Jan. 1 in New England, or elsewhere in the wide world, used enclosed arc lamps for street lighting? A. The Boston Electric Light Company —

Q. Jan. 1, 1898? A. — Jan. 1, 1898, was using them for street lighting. They began —

Q. Well, that is the same company that you have already spoken of. A. Yes, sir. I think in St. Louis also there were alternating — there were enclosed arcs used for street lighting.

Q. Any others? I do not want to deprive you of any that you think of. If you do not think of any more — A. I do not think of any at the moment.

Q. Now, right in Boston there were only a few experimental lamps up, were there, on Jan. 1, 1898? A. It was something more than an experimental circuit.

Q. How many lamps did they have up there Jan. 1, 1898, — how many enclosed arc lamps did they have up? A. I should say forty or fifty. Forty or fifty, I should think.

Q. Forty or fifty? A. That is simply my remembrance.

Q. Out of something like 3,000 street lights? A. Yes, they were just starting to change over the system at the time.

The CHAIRMAN. Two o'clock, gentlemen.

(Noon recess.)

AFTERNOON SESSION.

LOUIS BELL, *resumed.*

Cross examination by Mr. BROOKS, continued.

Q. If, Dr. Bell, there were full gate openings, what power would these vertical wheels at the electric plant of the Holyoke Water Power Company develop? Do you agree with Mr. Main, something like 70 horse power per mill power? A. I think they would,—I should say somewhere about that. I think they would do a little better than 65, which is on 75 per cent. efficiency. I think they would do a little better than that.

Q. Would you say that they would develop 70 horse power per mill power, with 20-inch gate openings,—of course with the head, that has been given all through this case, of 20 feet? A. I hardly know whether they would develop as high as 70; I think they would do better than 65, though. I do not know what the efficiency is.

Q. Have you made any calculation to determine it? A. I have made no calculation to determine it, not knowing the absolute efficiency of the wheels. That was not within my knowledge.

Q. Have you Mr. Main's Schedule 26, relating to the tests that were made at this plant? A. I do not know whether I have it here or not. Have you got it, Mr. Green?

Mr. GREEN. Schedule what?

Mr. BROOKS. 26.

The WITNESS. The schedule of test? I do not think I have it here.

The CHAIRMAN. Doesn't he assume Mr. Main's calculations to be correct?

Mr. BROOKS. Well, if—

The CHAIRMAN. Doesn't he, I say, not you?

Mr. BROOKS. Certainly.

The WITNESS. Yes, sir.

Mr. GREEN. No objection to your using my Schedule 26, if you desire. I have a lot of other stuff in my book. (Giving book to witness.)

Mr. BROOKS. No, I don't care. I think we ought to bring it out, in view of his testimony.

The CHAIRMAN. We have that schedule here, Mr. Brooks, if you want it.

Mr. BROOKS. I think I have all I care for of it.

Q. Mr. Main's Schedule 26 relates to the friction test, does it not? A. Yes, sir.

Q. According to that schedule, was not 52 horse power required to wheels A and B, or one and three, including incandescent and commercial shafting? A. That is correct. Yes, sir.

Q. And all other shafting? A. That is, with the shafting run at the maximum load.

Q. Well, that includes all shafting? A. It includes all the shafting as driven from those two wheels.

Q. That is what I mean. A. Yes, sir.

Q. That would comprehend all the shafting under the dynamo? A. All that is ever run in practice.

Q. All the shafting in the dynamo building? A. Substantially all, yes; all that is run in ordinary practice.

Q. And it would include, of course, the gear wheels and shafts and tunnels? A. It would include two gear wheels and the —

Q. I mean the gear wheels that relate to these particular wheels. A. It would include two of the four sets of gears and two of the four shafts through the tunnel.

Q. Now, referring to Mr. Main's schedule, with which you agree, as I understand you, was not 18 horse power required to operate one wheel, and its gears and tunnel shafts, or 36 horse power for two wheels? A. Substantially that; yes.

Q. Now, if you deduct the 36 horse power from the 52 horse power for the other two wheels and the shafting, was not the friction of all the shafting in the dynamo building 16 horse

power, the difference between 52 and 36? A. If you will please give me the question again. I can't see exactly what you are after.

Mr. BROOKS. Let him have the question.

(Question read by stenographer.)

Mr. BROOKS. According to this schedule made by Mr. Main.

The WITNESS. I don't think that is exactly determinable from that, because I don't know what the friction of one wheel and its own shafting only was.

Q. Take the figures that I have given. Just look at the second line of your Schedule 26, or Mr. Main's Schedule 26. A. That gives the wheel A with the shafting on the first clutch and cross drive.

Q. That is the tunnel shafting? A. That is the tunnel shafting and a little more, I think. I think —

Q. It probably includes the tunnel shafting? A. Probably includes the tunnel shafting; yes, sir.

Q. And that is all it does include? A. I think it includes some drive beyond the wheel shaft itself.

Q. But it wouldn't include in all the items more than two or three feet in excess? A. It includes —

Q. To the clutch? A. To the first clutch it includes, I think, the driving pulley, or something of that sort. It is a little more than shafting.

Q. Well, I will put my question again. Then, if you deduct the 36 horse power from the 52 horse power, was not the friction of all of the shafting in the dynamo building substantially 16 horse power, as disclosed by the tests of Mr. Main and his calculations from those tests? A. Assuming that the 18 horse power covers the wheel shaft to the tunnel, and that the other wheel shafts are like it, yes, it would leave some such figure as that.

Q. The wheels are all alike, are they not? A. Very much alike.

Q. Is there any substantial difference? Aren't they built of the same size, from the same patterns? A. The curves don't exactly coincide, but quite nearly.

Q. Would you say that 16 horse power was substantially a fair estimate? A. Of the friction?

Q. Of all the shafting in the dynamo building? A. No, I should not. I should say that the friction was a good deal higher than that.

Q. Taking Mr. Main's tests and his figures? A. I should say that the shafting was —

Q. Will you be kind enough to confine yourself to my question? A. I will; yes, sir.

Q. I am referring now to Mr. Main's tests and to his calculations from his tests.

Mr. GREEN. I suppose, if it is a mere matter of calculation from his figures, if your Honors please, that this cross examination would be hardly in order.

Mr. BROOKS. I don't know why not. We have had subtractions and additions and divisions already.

The CHAIRMAN. I rather think we will let it go on.

The WITNESS. That is the result that would follow from the figures which you have asked me to take.

Q. Mr. Main's calculations, from the tests that he made, and contained in Schedule 26? A. Mr. Main's —

Q. Will you be kind enough to answer my question? A. I will do so with pleasure.

Q. You can answer yes or no. A. Mr. Main's calculations from these tests show two widely different things from the water wheels and from the engines. I do not know which represents the friction from the shafting.

Q. You say they disagree? A. The friction —

Q. You say they disagree? A. I say the —

Q. Do you say they disagree? A. I say that the shafting friction is obtained from those two sources, the water wheels and engines, and they disagree.

Q. Then you do say they disagree, and they disagree 100 per cent., don't they, or more than 100 per cent.? A. I should say they disagreed by something of that sort; yes, sir.

Q. Confining yourself to the question, and running back to the original question, to which I desire an explicit answer, take Mr. Main's tests, as shown on his Schedule 26, of the water

wheels shafting, and his calculations resulting from those tests, it shows substantially the friction of all the shafting in the dynamo building is 16 horse power, does it not? There is no steam test in this. A. It shows at the most —

Mr. BROOKS. Just read my question, if you please.

(Question read by stenographer.)

The WITNESS. No, sir; it does not show it. It does not show that all the shafting in the dynamo house has a friction of only 16 horse power.

Q. I said substantially. A. No; not substantially. I don't think it shows that, because —

The CHAIRMAN. He has not asked you for the reason.

Q. Well, it shows 52 horse power for wheels A and B, doesn't it, with all the shafting, substantially? A. No, sir. Driving incandescent and commercial shafting shows 52 horse power.

Q. And gear wheels, too? It comprehends the gear wheels, doesn't it, and the shafting in the tunnel? A. It includes two of the wheel shafts in the tunnel, with the incandescent and commercial shafting, 52 horse power.

Q. And the other two,—that 18 horse power is required to operate one wheel and its gears and tunnel shaft, or 36 horse power for the two wheels, does it not? A. That does not follow.

Q. Well, does it show it, whether it follows or not? A. No, sir; it does not show that 36 horse power is required to run what you state.

Q. What does it show? A. It shows precisely what is stated in the test here, that wheel No. 1 —

Q. What does it show? A. That wheel No. 1, or A, running with the shafting to the first clutch and cross drive, takes 18 horse power.

Q. Does it show that wheel 1, or A, takes 18 horse power? A. Running with the shafting to the first clutch of that cross drive, it takes 18 horse power. That is precisely what it shows.

Q. From Mr. Main's test, what do you say was the friction of all the shafting in the dynamo room, confining yourself to

the four water wheels in Mr. Main's tests and the calculations derived from the tests? A. Now, will you give me the question again?

(Question read by stenographer.)

Mr. BROOKS. I am limiting it to the water wheels, and excluding the steam.

The WITNESS. I do not think that, from these tests to which you refer, that there are sufficient data to enable you to separate successfully the friction of the shafting in the basement of the dynamo room from the total friction of the shafting through from the water wheels and the gears. The water wheel test was imperfect in one respect.

Q. You say the water wheel test was imperfect. I don't care about that. I ask you to assume these tests, as delineated in this Schedule 26, and the calculations from them, as true, and then to tell me what the entire amount of friction for these four water wheels was, of all the shafting in the dynamo building,—assuming that these tests were correct and that Mr. Main's calculations from them were accurate. A. May I ask a question, Mr. Brooks? You want the friction simply of the shafting in the basement of the dynamo room, outside of the tunnel?

Q. Exactly. A. The data are not sufficient to enable me to compute that from those particular tests.

Q. Assuming that the data are sufficient that you have there in Schedule 26, which was introduced through Mr. Main, what do you say it shows? A. But the data are not sufficient for the judgment. I can't separate from these data—I cannot separate the total friction from the friction of those shafts in the basement of the dynamo room. The data are not sufficient to enable me to separate them.

Q. I will try it another way, if I can. Referring again to Schedule 26, it shows there that wheel 3, or B, with all the shafting running with a maximum load, developed 51 horse power? A. That is correct; yes, sir.

Q. It also shows that wheel No. 1, or A, with shafting on the first clutch on the cross drive, on the first clutch, developed 18 horse power? A. That is correct.

Q. A and B are alike, are they not,—the same dimensions, the same character, running the same length of shafting? A. May I ask for information? I don't remember whether the wheels A and B run the same length of shaft through from the wheels, or whether one is long and the other short.

Q. Well, say that they run the same; assume that they run the same? A. If they are the same length, they must be very nearly alike, certainly; very nearly.

Q. Then 18 subtracted from 51, under the assumptions that I have made, represents, in its total of 33 horse power, what? A. It represents the difference between the 51 horse power of wheel No. 3, with all the shafting run with maximum load, and the friction of wheel No. 1, or A, with the shafting to the first clutch in cross drive. It represents that difference, and that simply.

Q. It amounts to this, does it not, that therefore the friction upon all the shafting in the dynamo room driven by one water wheel is 33 horse power for a maximum load, assuming that Mr. Main's tests and calculations are correct? A. Not exactly that, because there is no test, if I may be permitted to say, there is no test which gives simply the friction of the wheel shaft through the tunnel. Always, in every one of these tests, that friction has something added to it, the friction of some bit of shafting, some set of pulleys, or something of that sort.

Q. Isn't that included in your 18 horse power? A. The 18 horse power—

Q. Isn't that included in the 18 horse power? If you say No— A. Well, the 18 horse power is made up of the friction of the wheel shaft and the gears through the tunnel, and also the little bit of shafting and pulleys, and it includes those two things. In other words, it includes the friction of the shaft through the tunnel, and a small fraction of the friction of the shaft in the dynamo basement.

Q. It represents, doesn't it, the friction of all the shafting in the dynamo building, 33 horse power, when one wheel is driven at maximum load? A. I do not think that it shows that.

Q. Assuming, you understand, that these figures are correct, and that the test that was made was accurate, and that the wheels A and B with their shafting were the same? A. It still leaves in doubt what the real friction of wheel I, or A, with the shafting extending only through the tunnel, without any drive on it, was. That might be nearly 18 horse power, and it might be 12 or 13. I don't know.

Q. Do you know from any tests that you yourself have made at this plant what the amount of friction of all the shafting is in the dynamo building when the four wheels are run at their maximum load? A. That test —

Q. Confine yourself to my question, please. A. Yes, sir; I will confine myself to your question.

Q. I don't want you to run off into theory about it. A. That test was not made by me, or by anyone else to my knowledge. Therefore I do not know.

Q. So, then, you cannot tell this Commission, when each wheel or all the wheels are running at their maximum load, what the friction of all the shafting in the dynamo building is, from any test that you have made, or seen made, or heard of? A. I could make an estimate of it.

Q. Just confine yourself to my question. A. I will do so.

Q. That is, based on a test? A. I think I could give them an approximate estimate, but not an exact figure, from these tests.

Q. Have you made an estimate, based on tests actually made there, of the amount of friction upon all the shafting in the dynamo building, when either one of the wheels or all four of the wheels together are running at their maximum load?

A. I have made an approximate estimate of that sort.

Q. I didn't ask you that.

Mr. BROOKS. I ask that that may be stricken out.

Mr. GREEN. You asked him if he had made an estimate.

Mr. BROOKS. Upon a test actually made.

Q. I will ask this: Have you made an approximate estimate, based upon tests actually made, of each one of the four wheels, or running the four wheels all together, when running at their maximum load, in that plant? You can answer that

yes or no. A. I can't understand that yes or no. I don't understand exactly what you are driving at.

By the CHAIRMAN.

Q. The question is whether you have made an estimate based upon the actual figures, or the data contained in Schedule 26. A. Yes, sir; I have made an approximate estimate, as far as the data would allow.

By Mr. BROOKS.

Q. I thought you told me a minute ago that the data wouldn't allow you to make an estimate? A. Wouldn't allow me to make an accurate estimate. I only made an approximation to it from those tests.

The CHAIRMAN. I would like to suggest, Mr. Brooks, I suppose that is a question for engineers that went up there and made the test.

Mr. BROOKS. Yes, sir; there won't be another question about it. I won't spend any more time on it.

By Mr. GREEN.

Q. I would like to be allowed to ask one question. I would like to ask if all the four wheels were run together. Were they all four run together, doctor? A. They were not, in these tests.

By Mr. BROOKS.

Q. Were not all the tests made there that either you or Mr. Main requested to be made? A. No, sir.

Q. What test did you request to be made of these water wheels that was refused? A. We wanted to —

Q. What request was made that was refused? A. We asked to have all four wheels run, with all the shafting as with a maximum load, understanding that they run all four wheels with a maximum load. And it was getting late in the afternoon, and they couldn't stop to make that test without interfering with the service, and we simply said nothing more about it.

Q. Did you attempt to go back the next Sunday and complete it, or any other Sunday? A. We didn't attempt to go back and complete it; no, sir.

Q. Did it suggest itself to you that it would be a good plan to go back and make it? A. No; for I thought we had sufficient other tests.

Q. Then you did think your tests sufficient to furnish information as to the loss by friction? A. Including the engine tests; yes, sir.

Q. I am talking now about water wheels. Did you think you had sufficient information from the tests made to determine the amount of power lost by friction, when the plant was run by water alone?

Mr. GREEN. I think his other answer is in the line with that.

Mr. BROOKS. I don't know whether it is or not.

The CHAIRMAN. I think he may answer that.

(Question read by stenographer.)

The WITNESS. We did.

Q. Did you or Mr. Main say that you thought, if all the load was put onto the No. 3 wheel, that would be sufficient for your purpose? A. I don't know what Mr. Main said. I am not aware of having said anything of that kind myself.

Q. Was that said in your presence, or that substantially? A. Not that I remember.

Q. Didn't you say it yourself? A. Not that I remember.

Q. Didn't you tell Mr. Allen, right over here (indicating), this Mr. Allen, that if you could have all the load upon the B wheel, that would answer the purposes that you desired? A. I really don't know whether I told him so or not. I have no recollection of so doing.

Q. Did you think it would? A. In connection with our engine tests, yes.

Mr. BROOKS. I notice Mr. Green bows his head.

Mr. GREEN. That was what he said.

Mr. BROOKS. I don't care what he said. I am working this out in my poor, unscientific way.

Q. You claim, don't you, that you lose in friction a mill power when this concern is run at its maximum load, when this concern is run at its present maximum load and 50 per cent. more? A. I should think the total loss in friction would be about a mill power.

Q. Have you figured that out? A. Roughly, from these tests, yes.

Q. And have you divided it up into the various elements?
A. I have not divided it up into its various elements.

Q. Can you tell us how much is lost by the gear wheel friction? A. I have not tested the gear wheel.

Q. Do you mean that you have not tested gear wheels?
A. I never tested any of those gear wheels. I have tested gear wheels.

Q. Can you tell how much power was lost by friction on the tunnel shaft? Have you figured that? A. I have not felt that I had sufficient—

Q. Have you figured it? A. I have not figured it, for I didn't have the data.

Q. Just answer yes or no. Can you tell me how much power is lost by friction on the shafting in the dynamo building? If you can't, I will pass right on. A. I can estimate it from the engine tests.

Q. I am not asking you about the engine tests. I am now confining myself to water power on the water wheels. A. I have already said that it can't be separated from the data we had on the water wheels.

Q. Can you give me the size and the details, and the various elements, if I may so express it, that go to make up your new and modern and ideal plant? A. Some of them; not all of them.

Q. Can you give me the size and length and the details of your shafting in the dynamo building? A. The shafting was figured, if I remember rightly, $4\frac{1}{8}$ inches.

Q. Say yes or no, if you can, to what I ask you. A. Approximately I can.

Q. Approximately? A. I can tell approximately.

Q. Can you tell accurately? A. No, I cannot.

Q. Can you give me any details of any of the elements of this new, modern, ideal plant that you prefer, accurately? A. I think so.

Q. What? A. I think so.

Q. What is the rated horse power in your boilers in your

new, ideal, modern plant? A. I did not figure the rated horse power. They —

Q. Very well. You have answered my question. I don't want any buts or because. A. I only want the evaporative power. I don't care a rap what the horse power rated is. I want to know what the boilers will do.

Mr. BROOKS. I ask that that answer may be stricken out.

Mr. COTTER. It may be stricken out. It is irresponsible.

Q. How many different boilers did you have in your new, modern, and ideal plant? A. Three water tube boilers, I believe.

Q. What? A. Three regular water tube boilers.

Q. What is it heated to, in the new and modern and ideal plant? A. I haven't the slightest idea.

Q. What is the grate service of the boiler? A. I really don't remember. I knew at one time, looked it up.

Q. What did you construct your buildings of, in this new and modern plant? A. Brick.

Q. How many brick? A. I haven't the slightest idea. I never figured it.

Q. Can you tell me anything about any of the quantities that go into your new, modern, ideal structure? A. Yes; so many square feet at an average price per square foot.

Q. How much in quantities of material would go into the building, of brick, or stone, or wood, or iron? A. I never figured it in that way.

Q. That is what I mean. A. I never do, never want to, and never practise it.

Q. I don't ask you what your practice is, or what you want to do, nor what you wish. A. You seem to be doing it.

Q. How much excavation did you allow to be required? A. I really don't know.

Q. How much back filling, or how much foundation? A. I really don't know. I have no interest in that. I know I can build —

Q. I only ask you that. Don't go outside of my question. Let us stay together a little while. A. We will try to.

Q. And we will get along all right for a short period. Are Manning boilers boilers that are made to-day? A. Oh, yes.

Q. And are they in good repute? A. I think they are. I think so. I have always considered them so.

Q. They are economical and they are efficient? A. Yes; I so consider them.

Q. Now, how much in all do you save in labor of firemen, for instance, in your new and modern and ideal plant, over the present plant? That is, how many firemen do you save? A. I don't think we save any firemen.

Q. You have the same firemen. Well, how many firemen do you allow for, in your new and modern and ideal plant? A. I believe three.

Q. Does your schedule show it? Perhaps it does. A. I beg your pardon. I will look in a moment. Firemen, three; yes, sir.

Q. What? A. Three firemen.

Q. Now, where can a plant be located, in the city of Holyoke, so as to use the river water for condensing, without first pumping the water? A. I think the chances would be you would have to pump the water.

Q. What have you allowed for pumping in your new and modern and ideal construction, if you please? A. I have made no separate charge.

Q. You have made no allowance for it at all, you have made no allowance for pumping? A. For the cost of steam, for pumping?

Q. Yes. A. Only as I think it is sufficiently included in the general steam charge.

Q. Did you have that in mind? A. Yes; that and operating the other subsidiary apparatus.

Q. Assuming that they have got to pump, how much did you allow for pumping? A. There is no specific allowance made for that, over and above the steam production.

Q. How much does that amount to, for pumping? A. How much for pumping? I haven't attempted to make any allowance in my mind.

Q. Then you haven't made the slightest allowance for it? A. Except as to coal, in the allowance for the general steam.

Q. Tell us, if you have included it in any allowance that you

have made, what allowance you have made for pumping? A. I haven't attempted to separate the pumping at all. It is in the subsidiary —

Q. If they have got to pump for condensing purposes, how many millions of gallons in 24 hours would they need to pump? A. I should say offhand three or four hundred thousand gallons. I don't remember.

Q. Three or four hundred thousand gallons in what time, for condensation? A. I really don't remember. I think it was something of that sort, though, when I figured it.

Q. In what time? In what time? In 24 hours how many gallons of condensing water would be required to run your ideal plant at its maximum load? A. At its maximum load it would run pretty high. I took it at an average. Something —

Q. How many hundreds of thousands of gallons in 24 hours would be required to run it at an average load? A. I think — I haven't it definitely in mind, but I should say the figure that is round the corner in my memory is about a half million gallons. I really don't remember.

Q. How did you determine that it was only half a million of gallons? A. I don't determine that it was half a million gallons. I say —

Q. What process do you use in arriving at that approximation? A. I haven't either made an approximation or used any process. You asked whether I had any —

Q. How would you arrive at the determination of the amount of condensing water that would be required to be pumped? A. Roughly, from the evaporative — from the amount of water evaporated. The boilers —

Q. Give the various steps of the processes by which you roughly arrive at the determination of four or five hundred thousand gallons for condensing purposes. A. I figured it out at one time, but I don't remember all the steps I went through. The rough process —

Q. I am going to ask another question. As an engineer, what method and processes and steps and rules did you apply in arriving at a determination of the amount of water for condensation that would be necessary for your ideal plant, on an

average load? A. In point of fact, I looked it up from tables in one of the books in my library dealing with that matter, and I have no further recollection.

Q. Well, did I interrupt you? A. I think it was one of the sets of tables belonging to Babcock and Wilcox boilers, or else Trautwine. I forget which.

Q. Now, doctor, could you yourself tell me the various processes and methods and rules that should be pursued in obtaining an estimate of the amount of water needed for condensation purposes in your new, modern, and ideal plant? A. I could sit down and work it out. I should hesitate to tell it off-hand.

Q. Tell me your processes, rules, and the methods that you would use, all of them. A. I could sit down and work it out, if that would be any comfort to you.

Q. It would be no special comfort to me, but go on. Everybody knows that I like water,—for condensation purposes.

The CHAIRMAN. I think it would be well to stick to facts.

Q. Can you tell me the steps and processes and the rules that you would pursue in determining the amount of water needed for condensation purposes for this ideal scheme? A. I could do so, but it would be a very tedious job.

Q. Well, go on. There is nobody watching us now. A. It simply resolves itself into a question of figuring the amount of heat which has to be turned over to the water in condensing the steam, and, within limits of temperature, the amount of water which is required to take that up.

Q. Can you now give this Commission the steps, the rules, the processes, the methods that should be adopted to obtain the amount of water for condensation purposes for your ideal steam?

The CHAIRMAN. Ask him whether he can or not now, right on the stand.

Mr. BROOKS. Yes; if he says no, that settles it.

The CHAIRMAN. If you cannot, that is all right.

A. I think I can, but it will be a very long and tedious process.

Q. All right, I will stand it; we are all getting paid by the day. So give us the processes, the methods, the rules, and all that you would use in obtaining this water necessary for condensation in the new scheme. A. The fundamental process is this: in order to condense with steam you must take care of a certain number of heat units which belong therein, and you must supply a certain amount of water to furnish that amount of capacity for condensation. Now, I cannot sit down here, without reference to any data at all, and from my memory quote the rules and data which belong to that thing.

The CHAIRMAN. Why don't you say you cannot do it?

The WITNESS. I cannot do it in that way; I never did—

Q. Can you give me now the processes, rules, methods, which you would adopt in order to condense? A. I cannot here give them from memory, no.

Q. All right, that settles it. Do you know how much it would cost per thousand gallons or per million gallons in your syphoning process to pump water from the river, assuming that you had any right to pump it from the river? A. I do not.

Q. What is the coal consumption in your modern ideal plant per horse power hour for an average load? A. 2.2 pounds.

Q. How do you arrive at that conclusion? A. From various data in my possession regarding the performance of such engines.

Q. Have you got them here? A. No.

Q. What test on engines of the kind that you are going to install in your new and modern and ideal plant and of the same size, with the same loading, have you ever made to determine the cost per horse power hour of coal consumption? A. I am not aware that I have ever tested engines of that particular size, speed, and make.

Q. What is your engine; what is the name of it? A. The engines on which those figures and the guarantees of efficiency are obtained —

Q. I am talking now about engines you are going to install in your new plant. A. Yes, that is what I am referring to.

Q. Yes, that is all right. A. Those engines were MacIntosh & Seymour.

Q. Who? A. MacIntosh & Seymour.

Q. What kind of valves do you have? A. One of them is a piston-valve engine; the other two are the regular MacIntosh & Seymour positive-valve motion.

Q. How fast do you have your engines going per minute in this calculation of two and something pounds of coal per horse power hour? A. The revolutions of the engines per minute?

Q. Yes. A. I cannot at the moment recall just what they were, but they were somewhat about 120.

Q. 120 revolutions? A. Something of that sort, yes.

Q. What is your steam pressure on these engines? A. The steam pressure was assumed at 125 pounds.

Q. For an average load? A. Yes.

Q. Have you made any calculation of the possible consumption of coal by these engines when you are running under a maximum load? A. I only have the builder's curves and guarantees.

Q. I am asking you for your own. A. I made none other than the facts relating to the engines themselves on these particular engines.

Q. Now, what kind of coal are you going to use in order to obtain these excellent results? A. Good steam coal, New River or something of that sort.

Q. What is its name?

Mr. GREEN. New River, he said.

A. New River, or equivalent grade.

Q. Did you ever know of any New River coal being used in the city of Holyoke? A. I haven't any idea whether it is used there or not, but there are good steam coals used there, I think equally good steam coals.

Q. Where is that mine? A. That mine is way down in Pennsylvania, I think.

Q. What? A. I do not know just where the New River mine is, to tell the truth. I never have had any interest in finding out.

Q. Do you know of any inland cities in Massachusetts as far away from tide-water as the city of Holyoke that use New River coal? A. I really do not know whether they do or not.

Q. How are you going to get your coal to your new scheme? I do not mean that in any offensive sense, but your new and modern plant? How are you going to get it there?
A. I assume that it will be brought by rail.

Q. You have got to have a branch track, haven't you? A. If no branch track happened to exist in that immediate vicinity where the plant happened to be.

Q. Have you located your plant where a branch track exists? A. I do not know whether a branch track then existed, because I do not know the location except —

Q. Do you know whether a branch track will ever be built?
A. It all depends upon where the plant happens to be.

Q. You do not anchor your location anywhere? A. Except as regards distance from the present plant and condensing water.

Q. Substantially two miles from the present plant? A. Yes, sir.

Q. Somewhere upon a river or stream where you can get condensing water? A. Precisely.

Q. You have not allowed anything in any of your estimates for railroads or building them? A. Building railroads? Oh, no.

Q. Or railroad tracks? A. No, I have not allowed anything for building railroads in this plant.

Q. Where are you going to put your coal when you get it to this spot and get your spot anchored? A. Store it in a coal shed out behind the boiler room somewhere.

Q. You have not in mind just where you would put it, of course. You have not got your spot located exactly? A. I assumed it would be stored —

Q. Have you got any plans made of this ideal structure?
A. No, I have not.

Q. Did you ever have any made of this ideal structure?
A. I made some rough sketches of it when I was planning it, laying it out.

Q. Where are they? A. I don't know just where the contents of my waste-basket go.

Q. You never made any plan of your electric plant that you

in your mind's eye would install somewhere? A. On the contrary, I did make plans sufficient to enable these estimates to be made with some precision, but I have not kept any plans to submit.

Q. Where did you see them last? A. I think I saw them last around my desk somewhere at home. I think they are probably in the waste-basket by this time. I saw them last about two months ago.

Q. You knew when you were called into this case that you would be expected to give testimony? A. Precisely.

Q. Did you have the same ideal plant in all its phases in December last in your mind that you have now? A. Yes, sir, the estimates were prepared —

Q. Without a change? A. The estimates were prepared — there have been no changes.

Q. When were your estimates prepared? A. The estimates were prepared —

Q. —and completed in their present form? A. I think I can tell you. I think they were prepared somewhere around the first of — the latter part of November, I think.

Q. The latter part of November; this last November? A. The latter part of this last November, yes.

Q. How would you build your ideal plant Jan. 1, 1898? A. Yes.

Q. How much is that depreciated, do you think, for the advancement in the art since Jan. 1, 1898? A. For advance in the art I do not know what depreciation should be allowed. There certainly should be something allowed.

Q. My question was advancement in the art. I do not want you to run away from it. A. There should undoubtedly —

Q. How much allowance have you made for depreciation in this new, modern, and ideal plant by reason of advancement in the art since Jan. 1, 1898? A. I have not separated that from the general depreciation? I allowed, I think, 4 per cent. depreciation.

Q. Can you answer me? Can you tell me how much you allowed? A. I allowed 4 per cent. total depreciation in these schedules, but I did not attempt to separate it.

Q. I have not asked you that. A. I did not attempt to separate it into age and use and advance in the art.

Q. Tell me the day load efficiency of your generating mechanisms in your modern plant. A. What do you mean by the generating mechanisms? That is rather vague.

Q. I suppose that covers the engines and generators? A. Well, if you say so, I assume that it does.

Q. I am going to stick to it. A. All right. Now what is it you want to know about? What do you want to know as regards efficiency?

(Question read: "Tell me the day load efficiency of your generating mechanisms in your modern plant.")

A. What do you mean by efficiency in that case, Mr. Brooks?

Q. I mean just what you would mean by it. A. Well, I am not at all clear about that. I would like to know what question I am answering before I attempt to answer it, please.

Q. You really do not know, honest, doctor? A. I know what I should mean, and I do not know what you mean.

Q. Well, we will take it just as you would mean. A. Well, that is simple.

Q. Have it to suit yourself. And, if you cannot answer me readily, I will pass on to something else. A. Well, the day load efficiency would be one generator operated from one 200 horse power engine.

Q. I wanted it in horse power,—I do not care about your processes,—in horse power or percentage. A. I should think the efficiency between the indicated horse power in the engine and the output of the generator during day load would be something like—at the present day load—something like 60 per cent.; but that is simply pure guess, Mr. Brooks.

Q. You have not calculated that? A. I have not calculated day load efficiency. That is simply an estimate.

Q. Have you calculated the night load efficiency? A. I have not calculated any efficiencies—

Q. If you have not, I will go on. A. —in absolute measure. I have not attempted to say what the absolute efficiency of the units should be. I have not used that figure in fact.

Q. You have not calculated upon the life of the present plant when proper care is taken of it in all its various branches?

A. I have taken it into account.

Q. What will be the life of the tail races and wheel pits if proper care is taken of them? A. I should say half a century, certainly.

Q. Wouldn't you want to raise that limit a little? If proper care is taken of them, there is no reason why they should not live for one hundred and fifty years, is there? A. If something serious does not happen to them.

Q. Assuming that the ordinary conditions prevail, and that proper care is taken of them, is there any reason why they should not live for one hundred and fifty years? A. Well, I should hardly expect them to live that long. I should hardly expect any piece of masonry to stand wear and tear that time, although they might.

Q. I am assuming, doctor, that proper care is taken. A. I should hardly give them a life as long as that.

Q. And if proper care is taken of the wheels and renewals made when parts wear out or give out, there is no reason why they should not live seventy-five years, is there? A. I should think it very doubtful whether they would stand up as long as that; very doubtful indeed.

Q. Do you know wheels that are running efficiently to-day that are more than fifty years old? A. No, sir, I do not know of any such.

Mr. BROOKS. I do not think of anything more I want to ask you.

Re-direct examination by Mr. GREEN.

Q. Doctor, you were asked if you had made valuations, or you mentioned valuations that you had made, of plants at Dubuque, Ia., and some other places. What did you value in valuing those?

Mr. BROOKS. How is that of any consequence, may it please your Honors?

The CHAIRMAN. How did he do what?

Mr. GREEN. I asked him what he valued. He was asked

if in making valuations at a certain place he did not take into consideration the business. I want to know what his valuation covered; in other words, whether it covered simply the physical features alone, which he is attempting to value here, or whether something more was being bought on which he used those figures.

Mr. COTTER. We think the question may be answered.

Mr. BROOKS. I would like to say, may it please your Honors, that I never asked him his methods of valuation for any particular plant, and they put this in evidence in the first place that he had made the valuations. Now they are enlarging the direct testimony. I do not think it is competent.

Mr. COTTER. If there is any uncertainty in counsel's mind as to whether that question was put, we think it had better be answered.

Mr. BROOKS. All right.

A. In these cases and others of a similar kind which I have had in my practice—

Mr. BROOKS. A little louder, doctor.

The WITNESS. In these and similar cases which have come up in my practice it has in every case been the business as a whole—plant, business, franchises, the whole thing, hoofs, horns, and tail—that was being valued.

The CHAIRMAN. That is what he said to Mr. Brooks.

Mr. GREEN. I was not sure, and I had it on my notes to refer to. I think I have nothing further to ask.

The CHAIRMAN. That is all.

Mr. GREEN. If your Honors please, I will make a beginning with Captain Manning. I expected to put on another witness, who is ill and cannot be here.

